Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS

Founded 1896

Chicago, February 21, 1925 (*Issued Every Other Week*) Volume XXVIII, No. 4

MEMBER A.B.C.

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Where Contract Work Is Largely Employed

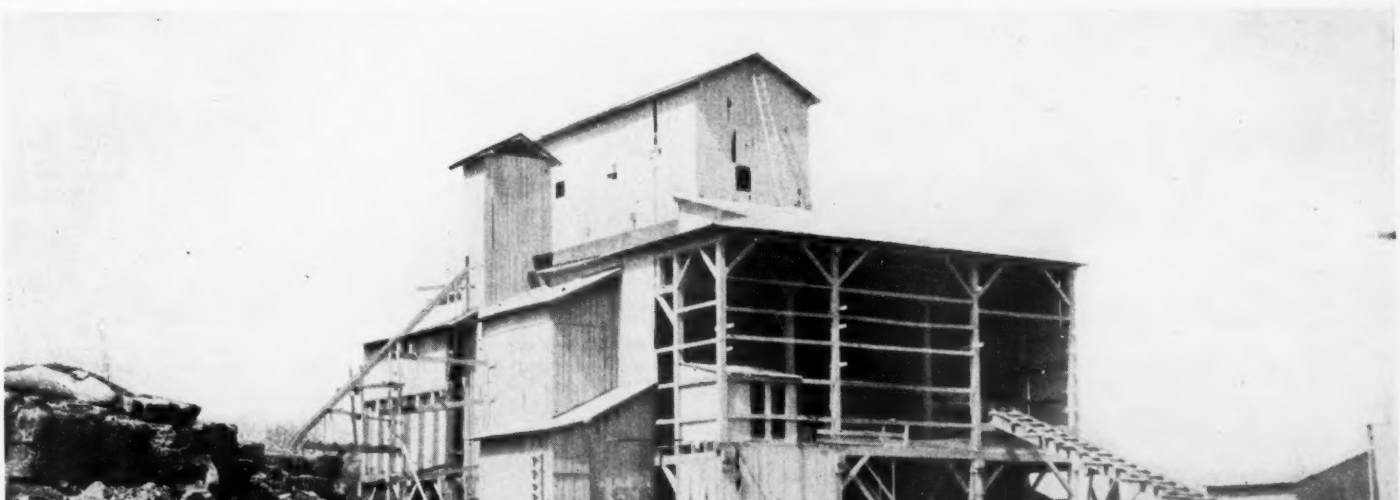
Franklin Plant of the Franklin Limestone Company Which Operates Four Plants Near Nashville, Tenn.

THE Franklin Limestone Co. is the largest producer of crushed stone in the Middle Tennessee basin. It has plants at Franklin, Lewisberg and Antioch, Tenn. The plant at Antioch has been completed this year, adding to an old one that was operated by this company.

All the plants have about the same capacity, 1000 tons per day, and all have the same general plant design. Furthermore, the same system of quarrying by contract is used. So a description of the Franklin plant will serve as a description of all, except for the fact that the new plant at Antioch has concrete bins instead of wooden bins and there are other minor details of construction which are different.

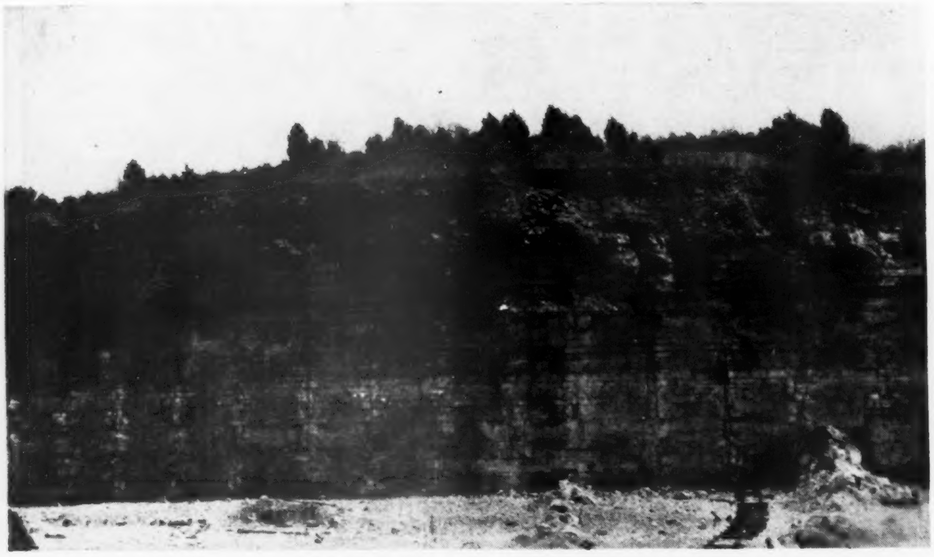
The Franklin plant is two miles from the city of Franklin, on a spur of the L. & N. railroad. It is 18 miles south of Nashville, where the rock finds its principal market.

The unique feature of the operation is that all the work is done by contract insofar as this is possible. Drilling is done on a per foot basis and loading and tramming stone from the quarry face to the plant is paid for by the delivered car. It appears strange to one who is acquainted with the quarries of Ohio and Pennsylvania, for example, to see an operation of such size conducted with so little machinery. One misses the familiar intermittent puffing of the steam shovels and the rattle of the dinkey on its way to the plant with a string of cars.



The plant from the quarry showing tracks converging to the plant incline

The quarry face is 85 ft. high in the highest part, sloping a little toward the ends. In drilling for a big shot holes are put down 15 ft. apart and 25 ft. back from



The face of the quarry is 85 ft. high. Holes are drilled 18 ft. apart and 25 ft. back. The load is of 60% powder below and 40% powder above

the face. The holes are not carried below the quarry floor, for it is desired to maintain a slight grade from the quarry face to the plant to assist in tramming.

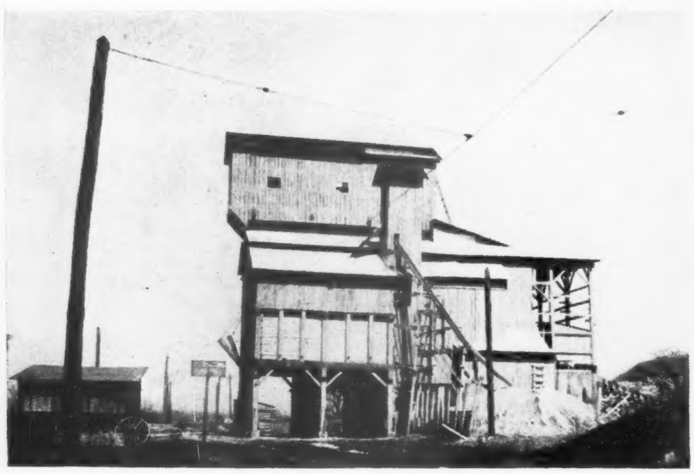
The holes are loaded with 60% Trojan powder at the bottom and 40% powder above. The fragmentation is generally very good, the shot leaving from 2 to 3% to be broken by pop shots. This is an especially low ratio when one remembers that all loading of cars is by hand and stones are one-man size.

There is on an average about three feet of stripping to be cared for and this is usually hauled out of the way by dump carts. Owing to the system of hand loading, it is possible to separate the stone from any small amount of dirt that might not be cleaned off in the original stripping process. The laborers shovel this dirt out to one side, and it is afterward hauled from the quarry floor by dump carts. In addition to being required to throw this dirt aside, they are paid for it at the regular rate of loading stone. Should the men grow careless in allowing this dirt to get in the tram cars, the foreman either lays them off or suspends them for a period of three or four days.

In loading the men leave behind the larger pieces which are later broken up by pop shots.

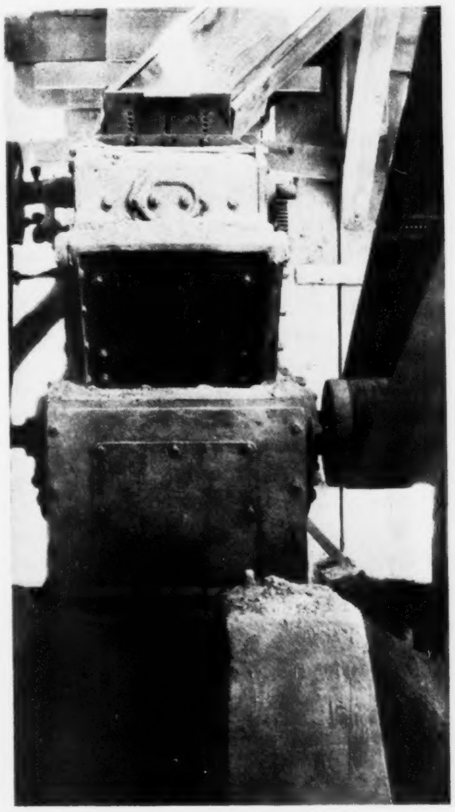
The loaded cars are trammed to the plant by hand, the empty cars being returned to the face in the same way. At the plant the loaded cars are dumped into a bin from which the rock is fed to a No. 7½ Allis-Chalmers crusher. The crushed rock goes to a 16-in. bucket and belt elevator which lifts it to a 20-ft. Allis-Chalmers screen at the top of the plant. This company states that it lays particular stress on the

Left—Pieces too large for one man to lift are left to be broken by pop shots. Right—Type of car used, made locally. It holds 1 1/2 tons



Left—End view of plant. Cars are loaded underneath bins and trucks from the spouts shown at the side. Right—The No. 7 1/2 primary and No. 5 secondary crushers discharge into the same elevator

proper screening of its stone because of the rigid specifications which it has set for itself for all work. The screen is a 20-ft. cylindrical screen with two outer dust jackets, thereby enabling all of the smaller material to be thoroughly screened. This screen is made up of 4-ft. sections so that any size material can be made to meet any crushed stone specifi-



Pulverizing mill which grinds screening for agricultural limestone

cations, ranging from ¼-in. down. up to 4-in. stone with variations of ½-in.

The oversize of the screen goes to a No. 5 Allis-Chalmers crusher and passes from this to the same elevator that serves the No. 7½ crusher, by which it is taken to the screen.

A large part of the screenings is ground to agstone in a Jeffrey pulverizer. The grinding is sufficient to make a size of product desirable for agricultural purposes. The plant stands in an excellent agricultural section and agricultural limestone finds a ready market there.

The cars used in tramming hold 1½ yds. and are designed by the company and built either at Franklin or in Nashville. The primary drilling is done both by the company and by contract. When done by the company, a well drill of its own design is used.

Concerning the contract system of loading and tramming, W. L. Lane, the superintendent in charge of operations, says that the company has adopted it after thorough study and investigation. He believes it is best for their conditions and thinks there is no economy in loading with a steam shovel where a No. 7½ crusher is used, as the stones have to be broken to one-man size anyway. As to the hand tramming, the distance from the quarry face to the plant is comparatively short and with the short run he has found that a man is more efficient than a mule or a small locomotive handling a string of cars.

The men like the contract system and make better than the going wage at it, some of them earning between $5 and $6 a day. A considerable portion of the crew is made up of negroes, but the more important jobs are held by white men. All the men work 9½ hr. and the contract men are obliged to work the same hours and to be on the job as promptly as those who work by the day.

The company evidently considers it better to work a number of small plants on this system rather than one large plant, since all the plants which they operate serve practically the same market.

J. E. Rodes is president of the Franklin Limestone Co., and F. J. Fuller is vice-president. H. E. Rodes is secretary and manager. The principal offices of the company are at Nashville, where they also do a retail business, handling their stone as a coarse aggregate for concrete work, and for road-building purposes, and in addition carrying a line of retail building materials.

A Pan-American Highway Association

THE building of good roads has gone from a national to an international status. J. Walter Drake, assistant secretary of commerce, in a Washington interview gives the following history of the Pan-American Confederation for Highway Education:

"Something more than two years ago," Mr. Drake said, "the Fifth Annual International Conference of Pan-American states held at Santiago, Chile, passed a resolution calling for an official Pan American Highway Congress. The director general of the Pan-American Union asked the Department of Commerce for advice and assistance. Following a conference, called at the department, of leading representatives of the American automotive industry, it was decided that the best plan would be to invite a group of outstanding representatives of the Pan-American countries to visit the United States as the guests of American industry to study at first hand our highways, highway construction, and motor transport. Other industries gladly joined in the plan and, with the help of the Department of State, some 40 road engineers and experts selected from 19 Pan-American nations were invited to this country.

"Last May the delegation arrived in the United States. Under the direction of the officials of the Bureau of Public Roads the party was escorted through nine states as the guests of governors and state highway departments. The itinerary followed was selected with a view to giving them approximately the same conditions of climate and soil as prevailed in their own countries. While they saw the highest type of modern road surfaces, most of their time was spent in states where a large part of the mileage is sand-clay, gravel, and other light type roads.

"Questions of finance were discussed with experts. The visitors were shown our most modern road-building machinery in operation. Particular attention was devoted to studies of the influence which the highway has exerted on living standards, health, suburban development, education, and associated subjects. Government, industrial, and public agencies everywhere along the line gave their full co-operation toward making the event a great success. The visitors found their American friends deeply and sincerely interested in their welfare. They gained much valuable first-hand knowledge of American conditions and in return left in the communities they visited a much better understanding of Latin America.

"The whole venture was so successful that at the conclusion of the trip the visitors voted to organize a permanent association to be known as the Pan American Confederation for Highway Education. It was agreed that national boards should be sent up in each country. This was at the end of June, 1924. Since that time boards have been organized and are now functioning in Argentina, Cuba, Chile, Honduras, and Peru, with cabinet members and highway officials as personnel. Detailed reports of the observations made here have been printed in Uruguay, Costa Rica, San Domingo, Brazil, Panama, Gautemala and the other countries of Central and South America. Road congresses have been held in Chile and Brazil.

Lime Resources in British Columbia Being Investigated

EXPLOITATION of the lime resources of Cobble Hill, B. C., and vicinity has been started by G. E. Bonner and Sons, Duncan, B. C. The ledge that is under development shows as high as 79% limestone by government analysis and is rather finely powdered. Considerable soluble matter including potash is also present.—*Duncan (B. C.) Leader.*

Highway Education Board Offers Scholarships to High School Students

THE Highway Educational Board, Willard building, Washington, D. C., offers four years in college with all expenses paid as a prize in a contest in essay writing, the subject of the essay to be "Economics Resulting from Highway Improvement." This is the sixth annual contest of the kind. Information as to the terms of the contest may be had by writing the board at the address given.

Mining Engineers Discuss Limestone and Limestone Products

American Institute of Mining and Metallurgical Engineers Gives Long Delayed Recognition to Great Basic Mining Industry

A SESSION at the annual meeting of the American Institute of Mining and Metallurgical Engineers, held in New York City, February 16, 1925, was devoted entirely to problems of limestone mining and the manufacture of limestone products. It was attended by about 40 mining engineers and others interested, including Dr. Frank A. Wilder, president and general manager of the Southern Gypsum Co., North Holston, Va.; John Rice, president of the General Crushed Stone Co., Easton, Penn.; S. M. Shallcross, general manager, American Lime and Stone Co., Bellefonte, Penn.; S. R. Russell, of E. I. du Pont de Nemours & Co., Wilmington, Del.; Wm. E. Farrell, chairman of the Manufacturers' Division of the National Crushed Stone Association, Easton, Penn.; Dr. Oliver Bowles, head of the United States Bureau of Mines Non-Metallic Experimental Station, New Brunswick, N. J.; J. R. Thoenen, mining engineer, Greenville, Ohio, all of whose names are well known in the quarry industries. It was the first recognition of the rock products industries ever accorded by one of the big four national engineering societies and for that reason a meeting of considerable historical significance.

Mining Problems

J. R. Thoenen, consulting mining engineer, Greenville, Ohio, now engaged in a special investigation of limestone mining for the United States Bureau of Mines, whose articles in ROCK PRODUCTS during the past year constitute the first comprehensive treatise on the subject of limestone mining ever published, read a paper, "Limestone Production as a Mining Problem," of which the following is a brief abstract:

"If asked whether limestone production was a mining problem I would not hesitate to answer emphatically in the affirmative. The question, 'When is a quarry a mine?' is familiar. The immediate mental picture induced by the thought of limestone production is that of an open quarry. All are familiar with the open pit in the iron-producing districts of Minnesota and Michigan and the open cuts of the so-called "porphyry" coppers of the west. If these are mines, they differ little from limestone quarries in general mode of operation; if quarries, why do they need the attention of mining engineers?

"During 1923, the United States produced in round numbers 70,000,000 tons of iron ore. The limestone production of the United States for the same period was something over 100,000,000 tons. In tons, it about equals the oil production of the United States.

"The uses of limestone are legion. A paper read by a prominent engineer of Chicago, at the meeting of the National Crushed Stone Association held February, 1924, in St. Louis says: 'There is no industry in the United States today that is more basic in its operation or by itself controls more industries. There is hardly a chemical operation, hardly a metallurgical operation or building operation that a crushed-stone man does not control if he will jump in and make the full utilization of it.'

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"It has been said that without iron we would revert to the Stone Age; how much iron would we have without limestone? From the point of view of the mining engineer, using the term in its broad sense to include geologists and metallurgists, the production of limestone is important because of its occurrence, volume, commercial importance, and the problems presented by its recovery and treatment.

Large Limestone Deposits on the Surface Being Depleted

"The large limestone deposits situated on the surface and in close proximity to markets are becoming depleted; rapidly in some cases, more slowly in others. In the search for new deposits, the geologist is particularly interested. He can help not only as to actual location, but also in predetermining whether a given location will furnish stone suitable for the market it is intended to supply. Users of limestone are becoming more and more particular as to the chemical and physical properties of the stone they buy. Some limestones admirably suited for one market are useless in another. The manufacture of lime and cement as well as the use of flux stone might be termed the 'metallurgy' of limestone. Lime is burned today in many places exactly as it was hundreds of years ago. Though cement manufacture is of more modern development, combustion engineers say the modern rotary kiln for cement making is not the last word in efficiency.

"At a recent meeting of the Ohio Local Section, the effect of different grades of coal on the cost of steel manufacture was discussed and it was quite evident much saving could be made with certain kinds of coal. If the grade of coal is important, why would not different grades of limestone react similarly? At one quarry, two kinds of limestone are mined, one white and one gray or blue. It is stated that both have the same chemical composition and make equally good lime, except that the lime from the one is a little whiter. Something causes that difference in color. The gray limestone is hard while the white is soft. Other peculiarities in this material might offer interesting problems to the metallurgist.

"To the mining engineer interested in production, limestone is important because of its volume, commercial importance and the problems presented by its recovery. Most of the limestone is produced from open quarries, of which there are three types, depending on whether the crushing plant is below, above, or on the same level as the quarry itself.

* * * * * * * *

"Few open quarries or mines are free from the expense of overburden removal. Because of the comparatively higher value of its product, and its greater vertical extent, the metal mine can usually stand a greater cost per ton in this respect. On the other hand, smelting and refining charges against the metallic ore add materially to the ultimate unit costs and thus reduce the amount that can be allowed for stripping. Furthermore, the metallurgy of limestone or its calcination to lime or cement, parelleling the smelting of metallic ores, would automatically result in a higher market value for the ultimate product and likewise allow the removal of more overburden. The lime and cement manufacturers are turning to the so-called higher-cost mining methods.

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"The proportion of open metal mines using mechnical shovels for loading cars is greater than in limestone quarries, because they do not require a sized product. In many cases where the quarry uses hand methods, mechanical means would not apply as, for instance, the loading of stone for consumption in lime kilns. The kiln requirements for a sized stone prohibits the use of mechanical shovels, unless the cost and operation of screening machinery is

less than the extra cost of hand loading and sorting.

* * * * * * * * *

"Underground mining of limestone is as yet of comparative minor importance. Nevertheless, as shown by my notes and observations of the past year, of the 100,000,000 tons of limestone produced in this country annually, something over 6,000,000 tons come from underground workings. Many cement and lime manufacturers have found it cheaper to mine than to remove overburden. Others find they can get a cleaner stone, and thereby a higher grade product, from the mine than from the quarry. Still others have turned to mining to solve the question of year-around production.

* * * * * * * * *

"Whatever opinion may be held respecting limestone quarries in general, there can be no doubt that the underground limestone deposit is a mining problem. But, its problem differs from metal-mine practice in many particulars, and any metal-mine method used in limestone without careful preliminary study of existing conditions may cause serious trouble. Mining engineers have called it folly to think of carrying rooms over 30 ft. wide; on the other hand limestone operators hold there is no danger in rooms 100 ft. wide in limestone. There are instances where both are wrong, and others where both might be right. However, a limestone mine that has had careful technical study and advice invariably shows it on the cost sheet. The American Lime and Stone Co. of Bellefonte, Penn., has one of the few underground limestone mines in this country operating on an inclined stratum, and using a regular backstoping method over shrinkage and loading through chutes. That the company is successful indicates that limestone production is a mining problem.

"In conclusion, I have found that very few limestone operations use the service of mining engineers. To the average quarryman any mining system spells expense, and it would surprise many of them to learn that so-called expensive limestone mines often produce stone at a lower cost than does the open pit. Mining engineers should, therefore, endeavor to convince the limestone operator that limestone production is a mining problem."

Valuation of Limestone Properties

C. C. Griggs, assistant head of the Engineering Division, Internal Revenue Bureau, Washington, D. C., presented a brief paper, "Engineering in Limestone Production," illustrated by views of and a brief description of the operation of the Michigan Limestone and Chemical Co., Rogers City, Mich. The most interesting part of Mr. Grigg's paper follows:

"Many factors must be considered before a promoter could procure the money necessary to launch such an enterprise, for a conservative banker will only recommend a successful producer while the promoter must provide funds on his own and his engineer's judgment. An engineering investigation must be made premliminary to expenditure for actual operation, which, for a limestone deposit, would naturally embrace such subjects as:

1. Tonnage available.	Readily available. Possibly available. Chemical analysis.
2. Marketability of product, and effect and possibility of increased production during life of property.	Limestone flux. Cement. Building blocks. Chemical uses: Carbide, sugar, paper, alkalies. Fertilizer. Plaster and wall finish. Road material.
3. Costs	Operating: Repairs, quarrying, preparation of product, development (current). Overhead: Management, supervision, sales. Taxes, insurance, and interest.
4. Working conditions.	Weather conditions in district and their possible effect upon full time operation, curtailed operation, and, incidentally, the transportation of product by rail or water. Labor.
5. Cost of plant and equipment.	Equipment necessary for quarrying, preparation of product and loading for transportation.
6. Physical difficulties.	Water supply: Limited or unlimited. General operating: Obtaining supplies, obtaining repairs.
7. Selling price	Estimate made for product throughout life of quarry.

"After compiling his data, as outlined, the enginerr is ready to prepare his report. For a limestone property he must bear in mind that the industry depends on large production and small profits. As the small margin does not permit the use of such safety factors as are applicable to other minerals, all items must be given careful consideration before his decision is made. While the engineer may be too liberal and report favorably on a property not meriting such a forecast, he may also be too conservative; and as the margin is narrow, he may condemn a property that under proper management would prove an unqualified success. Satisfied as to three items: life of deposit, average production, and expected profit, the final answer is merely a matter of figures. Obviously a promoter should assure himself and his investors that the undertaking would return all the money required for plant, equipment, land, etc., as well as a fair rate of interest on the investment. Leading valuation engineers in America and England hold that the Hoskold's formula is satisfactory in meeting these conditions:

$$Pn = \frac{1}{\dfrac{r}{R^n - 1} + r'}$$

in which Pn = the present value of each \$1 operating profit accumulated during a life of *n years*, r' = interest rate on capital r = interest rate for redemption, and

$$R^n = (1 + r)^n$$

"One would not care to invest in a limestone property without assurance of at least 10% return and that at the end of the operations the company would have on hand the original investment in quarry, plant, and equipment, either to distribute as return of capital, or with which to purchase another property. The factors given below, when applied as will be shown, will do this. Only a few factors are given, for a 10% annual return on the investment, plus an amount which, placed in a sinking fund at 4% compound interest, will return the capital. The other factors for any period are readily available.

AT 10 PER CENT AND 4 PER CENT

Years Life		Years Life	
5	0.702675	25	0.322549
10	0.545581	30	0.282893
15	0.444619	35	0.251559
20	0.374302	40	0.226196

"As an example, suppose the engineer has determined the following: Life of property, 30 yr; expected profit per ton, 50 c.; annual production, 50,000 tons; estimated cost of plant and equipment \$250,000. Then, expected profits would be: $30 \times 50{,}000 \times \$0.50 = \$750{,}000$, and the present worth of this amount, which would produce the return stated, would be: $\$750{,}000 \times 0.282893 = \$212{,}169.75$.

This indicates that the proposition would not justify a plant and equipment costing \$250,000, for there would be nothing left with which to purchase quarry land, and provide for the other expenditures necessary at the beginning. If the estimated cost of plant and equipment required were \$150,000 instead of the \$250,000, it would prove a profitable venture, assuring the investors of a 10% return, if the cost of the quarry land, development and other initial expense did not exceed the difference of \$62,169.75.

Operations Killed by Too Much Equipment

Many mines are killed by too much, or all-advised, equipment. The estimate of the present worth of the earnings, as illustrated, furnishes a ready check on the amount justified for plant, equipment, and development; for, if these estimated initial expenses exceed the present worth of the expected earnings, it would be better to invest the money in safe securities than to take hazardous chances. As countless safe investments returning 6 or 7% interest may be obtained, the extra 3 or 4% would barely compensate for the chances taken in promoting an unproved enterprise."

John Rice, president of the General Crushed Stone Co., Easton, Penn., in discussing the foregoing theory, pointed out that a formula involving a factor with six places of decimals was rather an unnecessary refinement when the producer could seldom

tell within 10% what part of his product he could dispose of.

Nathan C. Rockwood, editor of Rock Products, said that the life of the market was of far greater moment to limestone producers than the life of the deposit and gave some illustrations where the life of the deposit means little to the success of the enterprise.

S. M. Shallcross, general manager of the American Lime and Stone Co., Bellefonte, Penn., also brought up the life of the markets and said that what the limestone industry needed most were technically trained engineers with all-around experience in operation more than specialists in any one line.

Cement Problems

The excellent and comprehensive paper of John J. Porter, vice-president and general manager, Security Lime and Cement Co., Hagerstown, Md., is reprinted in full elsewhere in this issue. It was listened to with great interest but aroused no discussion.

Gypsum Manufacture

A paper by Dr. Frank A. Wilder, president and general manager, Southern Gypsum Co., North Holston, Va., on "Rotary Calciners for Gypsum," gave a brief resume of the remarkable growth of the gypsum industry and briefly sketched the manufacturing operations. Some of the high points of his paper follow:

"About 20 years ago the Cummer process, of which a rotary calciner was a feature, was introduced for treating gypsum, and was used in New York state for about 15 years. One small plant of this type is still operating in Mexico City. In the Cummer process, heat was applied to the gypsum as it passed through a rotating cylinder. The movement of the smaller particles was hastened through the cylinder by a fan. The gypsum, hot from the calciner, was allowed to stand for several hours in air-tight bins. The purpose of this was to permit a readjustment of the chemically combined water. Some of the gypsum was undercalcined and the cores of the larger lumps were not calcined at all; some was overcalcined and lost all of its water. It was believed, and the results obtained indicated that there was some measure of truth in the proposition, that the undercalcined portion of the mass in the bin would in time contribute a portion of its water of crystallization to the overcalcined and, if drawn from the bin at the proper time, the entire mass would be in the desired hemihydrate form.

"The calcined gypsum produced by the Cummer process was often erratic in set, and required unusual amounts of retarder, indicating the presence of some raw gypsum. However, the product was very plastic. It had unusual bulk after grinding and was acceptable to the plaster trade in spite of its occasional bad behavior in the way of erratic set.

"The producers who used the Cummer process gradually discovered that they could secure the same, and even better, results with less cost in rotary kilns of cement-mill type, and without the expense and delay of storing in sweat bins. Raymond mills grind the hot gypsum as it comes from the calciner. In this fine state, molecular readjustment evidently takes place in the mill, in the storage bins and along the screw lines. Certain mills in New York state are producing calcined gypsum for wall-plaster manufacture by this process at the present time.

The Emley Process

"When the Emley process for making gypsum more plastic was introduced 3 years ago, it seemed particularly adapted for use with a rotary calciner. As described in the patent that was issued to W. E. Emley of the Bureau of Standards, the process is one of increasing the plasticity of calcined gypsum which consists of grinding the calcined gypsum to eliminate the water content during the grinding operation, preventing the escape of the said water content during the grinding step and continuously keeping the above treated gypsum in contact with the water thus eliminated, ceasing the grinding operation and permitting the water thus eliminated to be reabsorbed.

"One of the more recently constructed mills in New York combined a rotary calciner with a ball-mill operating in closed circuit for grinding. The results were somewhat in line with expectations, but developed some troublesome and wholly unexpected features. An exceedingly plastic calcined gypsum was produced. One characteristic of such plastic material is that it packs like damp snow. It refused to flow through spouts or to move satisfactorily in the ordinary conveyors. When mixed with the customary amount of sand, it made a mortar that was too sticky. It could not be worked in the form of neat wood-fiber plaster. The ball-mill was opened to permit a free circulation of air and the situation was somewhat relieved.

Can Rotary Calcining Be Introduced in All Fields?

"The interesting question now is whether rotary calcining can be successfully introduced in other gypsum fields. The outstanding fact is that this method of calcining, with perhaps one exception, is confined to the western New York field. It is possible that the physical characteristics of the gypsum of western New York have some bearing on the question. This gypsum seems to make fewer fines in crushing than the gypsum of some other localities. On account of the low temperature and the ease with which gypsum calcines and the difference in the nature of the product produced by relatively small change of temperature, to secure uniformity the material fed to the rotary calciner should vary in size as little as possible. Results comparable to those secured in New York might be secured elsewhere if the gypsum were crushed to pass a 1-in. ring and everything passing a ¼-in. ring calcined separately and at a temperature lower than that used for the larger lumps.

"The saving in operation costs is estimated by different individuals in the gypsum plaster business, all the way from 25 cents to one dollar. If it were necessary to double the installation in order to treat the fines separately, the additional operating and maintenance cost with interest and depreciation must be taken into account as an offset to saving in operation.

"For a plant of ordinary capacity that must manufacture some second-settle stucco, finishing plaster, or any of the gypsum products for which gypsum calcined in a rotary is not adapted, the installation of a rotary calciner does not seem practical as the expense of installing and operating two systems would be burdensome. In a plant where the equipment may be considered from the standpoint of wall-plaster production alone, the installation of rotary calciners may be regarded as an open question. The plasticity desired can be obtained by other means, and in ways that will permit of variation to meet the sands of different markets. Unless there is ample capital and demand for output sufficient to justify the installation of a separate installation to handle the fines, the use of a rotary calciner in a field where the gypsum crumbles easily is not wise in the light of existing information."

Phosphate Rock

"Phosphate Deposits of Idaho and Their Relation to the World Supply," was the title of a paper by R. D. Kirkham, geologist, Idaho Bureau of Mines and Geology, Moscow, Idaho. This paper was quite a comprehensive discussion of phosphate rock from a geological standpoint, from which we will make extracts in a subsequent issue of Rock Products.

Following is the program of the Institute's non-metallic minerals section:

Non-Metallic Minerals

Heinrich Ries, *Chairman*

Limestone Production as a Mining Problem—J. R. Thoenen, Consulting Mining Engineer, Greenville, Ohio.

Engineering in Limestone Production—C. C. Griggs, Assistant Head, Engineering Division, Internal Revenue Bureau, Washington, D. C.

Manufacturing Problems of Cement Industry—John J. Porter, First Vice-President and General Manager, Security Cement and Lime Co., Hagerstown, Md.

Rotary Calciners for Gypsum—Frank A. Wilder, President and General Manager, Southern Gypsum Co., North Holston, Va.

Phosphate Deposits of Idaho and Their Relation to the World Supply—Virgil R. D. Kirkham, Geologist, Idaho Bureau of Mines and Geology, Moscow, Idaho.

Mineral Wool and Cement From a Silicified Lime Rock

General Insulating and Manufacturing Co. Utilizes a Rock That Fuses to a Silicious Slag for Making Insulating Materials and Products

By J. R. Thoenen
Mining Engineer, Greenville, Ohio

A "pallet" of the wool

MINERAL wool blown from furnace slags has been known and used for years but that blown from a fused natural stone is of comparatively recent origin. Several years ago the Cella family of St. Louis, Mo., became interested in this product, organized the General Insulating and Manufacturing Co., and began the manufacture of mineral wool at Alexandria, Ind., from a local stone called "wool rock." The mineral wool and a cement made from the same rock are sold as separate materials and they are also combined and manufactured by the company into a number of forms of insulating products.

The wool rock occurs in irregular beds or lenses in the Niagaran formation of central Indiana within a 50-mile radius of Alexandria. So far as the writer knows it is not found at any other point in this country. It is unconformable, both top and bottom, with the other strata and varies in thickness from 4 to 12 ft., thinning out to nothing in places without regard to direction or dip. The rock is quite soft, of granular structure, with a light yellow or brownish-green color and no regular stratification. Numerous fossils are to be seen and the bed is cut by many watercourses. From its physical appearance it would seem to be a low grade, silicious dolomite containing considerable alumina.

The wool rock is overlaid in places by a series of impure limestones and shales and they in turn by from 2 to 6 ft. of gravel and loam. At other points, due probably to glacial action, the wool rock and limestones are entirely lacking and the gravel beds extend to considerable depth.

In recovering the wool rock the surface loam and gravel are first removed by dragline bucket and double drum steam hoist and the cap limestone and shale blasted, hand loaded and crushed for road material. The wool rock is then quarried in the usual pit quarry method, using steam driven piston drills and 40% gelatin dynamite. The rock is loaded into 4-ton, rear dump steel quarry cars by steam shovel, hauled up an incline track by steam hoist and dumped directly into auto trucks which convey the material approximately ½-mile to the factory. Formerly this rock was dumped onto a No. 5 gyratory crusher and broken to 2½-in. size, then loaded into an aerial tram and transported to a storage bin at the factory. Spalls and fines interfering with the action of the cupolas it was decided to burn the rock without crushing.

The cupolas, four in number, are of the usual vertical, water jacketed, steel cylinder type, approximately 7x16 ft. in size, charged at the top with coke and wool rock. The rock is here subjected to a temperature of approximately 3000 deg. F., at which fusion into a slag takes place. Each cupola is equipped with individual fan and water supply. The liquid slag is drawn off at the bottom through a small tuyere placed about 6 in. above the open end of a steam jet supplying live steam at 100 pounds pressure. The steam picks up the stream of molten rock and breaks it into fine white fibres carrying them into the cooling or wool

Plant of the General Insulating and Manufacturing Co., near Alexandria, Ind., in which wool is made from rock

rooms. These fibres cool rapidly in their passage through the air and fall gently to the floor in a manner which resembles a heavy snow fall. Much care must be exercised in the blowing operation, for if the particles come in contact with each other

Quarry and dragline dump from rock-house

prior to cooling, or the walls of the room they unite and form "shot" or small balls of silica with no insulating value. This process is continued in one room for a period of several hours and then the steam is directed into an adjoining room. While the second room is being filled, men enter the first room and remove the wool in bags for immediate shipment or in bulk for further fabrication.

The operation of the cupolas is continuous and terminates only when the accumulation of lime at the bottom is sufficient to block the tuyere (about three weeks). As lime or CaO requires a higher temperature for fusion than the wool rock it gradually fills the bottom and "freezes" the cupola. Charging then stops and the bottom of the cupola is dropped and the lime removed. A new charge is then put in and the process repeated. The accumulation of lime is probably due to the calcination of the calcium carbonate in the wool rock, in the upper part of the cupola, prior to its reaching a fusion temperature.

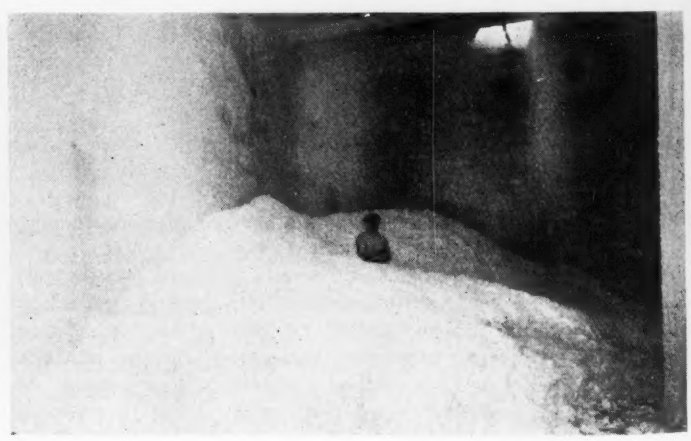
The wool rock is calcined in a separate furnace by another operation to make a cement without the admixture of other ingredients. After burning, this cement is crushed and pulverized in chilean mills and disk crushers. In this condition it has much the appearance of fireclay. It is quick setting, quite strong, and is said to stand a heat of 2500 deg. F. at which point its expansion is only 1/32-in. per foot.

In making up into insulating products the wool and cement, with small quantities of other materials, are mixed with an excess of water in various proportions, depending on the material to be made from the mixture. Insulating products for different purposes require different mechanical manipulations as well as different chemical compositions. Many of the processes in use are still in the experimental stage while others have been fully standardized and new processes are being developed as new uses for the material arises.

The ingredients are mixed by mechanical beaters, similar in operation to those used in the manufacture of pulp paper. Bricks are pressed in molds with powerful toggle presses but will later be made in machines developed at the factory. "Blocks" are pieces of the material compressed into sections approximately 18 by 24 in. in size and any thickness. These are formed by compressing the felted material on platens as they pass under rolls. Material for pipe covering is molded, cloth covered, and banded similar to other pipe covering.

All molded products are placed on steel racks and run into the drying furnaces after a sufficient time has elapsed for air drying or curing. In these drying furnaces they are subjected to a temperature of 200 deg. F. until the remaining moisture has been driven off after which they are stored for packing and shipment. Drying furnaces

Overburden is removed by hand loading



Left—Removing limestone capping from wool rock. Right—The wool in the cooling rooms looks like drifts from a heavy fall of snow

The "GIMCO" plant has pleasant surroundings

are heated by fuel oil through burners developed at the factory. This method of firing does away with a system of gas producers previously used for this purpose.

Scraper bucket used for stripping

The product is a remarkably clean, white material, closely resembling asbestos insulation and lends itself well to fabrication into all shapes and forms. Its insulating property is well illustrated by an experiment conducted for the writer's benefit. A piece of "block" about 6x8x2 in. was placed flat side down over the blacksmith forge and heated to a white heat or in fact until a part of the lower side began to melt. Quickly removing the block from the fire it was inverted and placed on the writer's bare hand while still glowing on the upper side. The heat was barely perceptible to the touch.

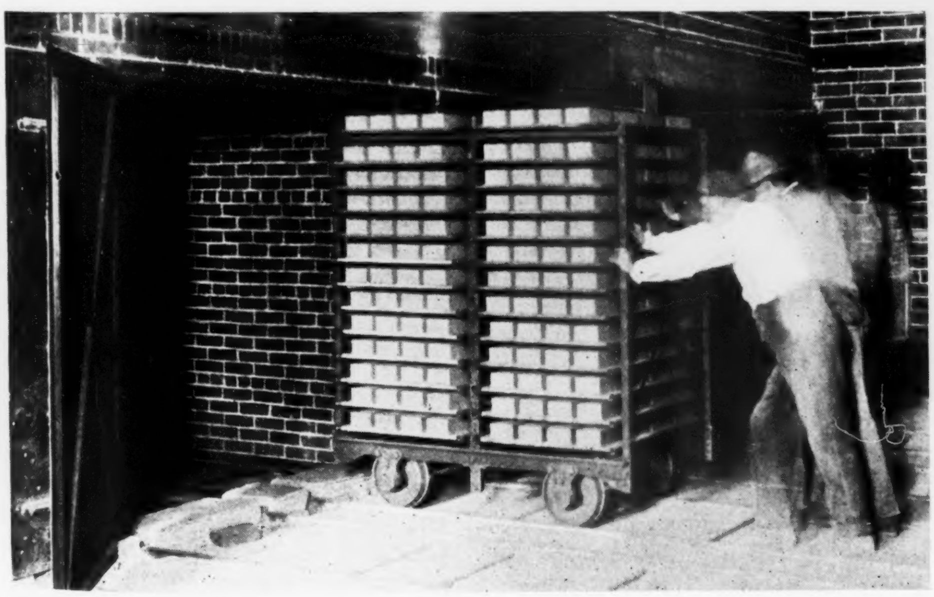
The factory buildings are built of concrete, brick and steel throughout. In their fifteen acres of floor space ample room is provided for accommodating new processes as well as expansion of present ones.

Those products now being manufactured and placed on the market are:

"Blocks" of felted wool 18x24 in. used for boiler covering and buildings.

"Flexfelt" is raw wool felted and sewed into "blankets" in such sizes as ordered. These blankets are sewed over chicken wire and backed with metal lath or expanded metal. This material is used mostly in providing insulation for enameling ovens, the metal lath providing a bond for cement plaster covering.

"Granulated" wool is sold for packing around heaters. Brick, for cupola and furnace insulation. Pipe covering, cloth covered and banded for all sizes of pipe. Raw wool in bulk is sold for various purposes such as refrigerator and fireless cooker linings, etc. All products are marked with the company's trademark GIMCO.



Pushing a car of insulating products into the dryer

Discharge end of tramway. Coke cars, in front, on elevated track

In the vicinity of the plant is what appears to be a small lake but is in reality the flooded remains of a former quarry now abandoned. Employes of the company have formed the GIMCO hunting and fishing club and will make this lake their particular stamping ground. Arrangements have already been made for the construction of bathing beaches and camp grounds where all may enjoy the out of doors.

Mr. W. I. Coppock is general manager and has gathered around him a capable and loyal staff.

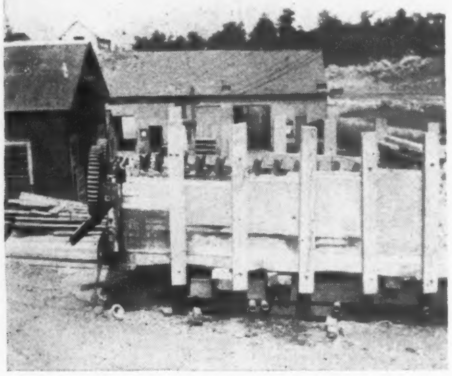
Crushed Stone Washing Methods

A Comparison of the Methods and Machines Used at Different Plants to Remove Clay

By Edmund Shaw
Editor, Rock Products

THERE are two reasons why the washing of crushed stone tends to become a more common practice. The first is that specifications for concrete aggregate are becoming more rigid and in some localities stone with a little clay, which was at one time accepted without question, is today rejected. The second reason is that quarrymen are studying wastes more carefully and that they are finding it possible to reclaim good stone from what was formerly waste material at a reasonable cost by washing.

As an example of the first reason applied to production one may take the Birdsboro Stone Co.'s plant described in Rock Products, October 4, 1924. Here the entire output is washed, a practice that began in 1922, when it was seen that to produce a material capable of meeting the most rigid specifications for ballast and concrete aggregate all the clay occurring in seams and fissures must be got rid of. The success of this company is ample justification of its decision to build a washing plant and other companies in the east are considering a similar decision. Naturally they do not want to go to the expense of building and operating washing plants until it is forced upon them, but they admit the possibility and are making a thorough study of the matter in order to be ready if they have to choose between washing and losing business.



Log-washers ready to be installed

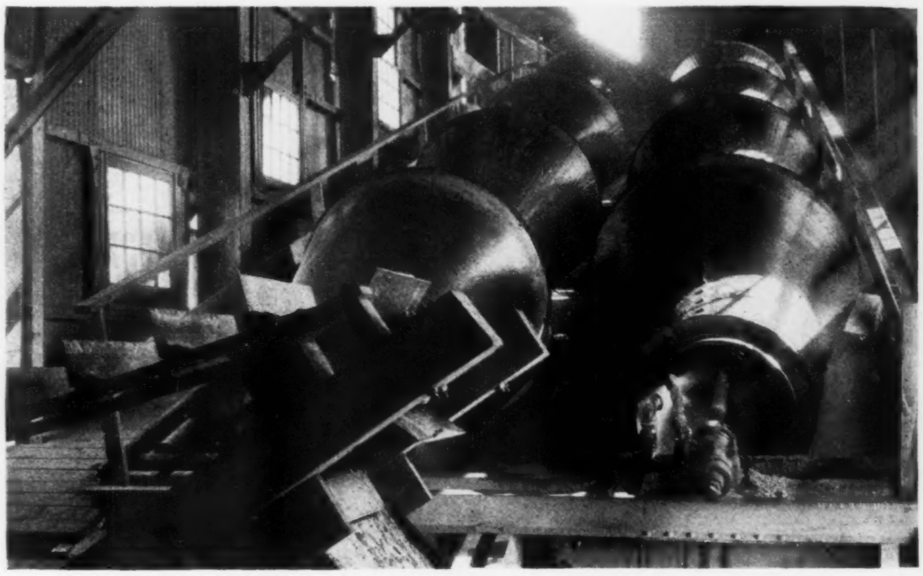
There are many examples of the case in which washing has been adopted as a means of recovering good stone from a waste product. The plants of the Bethlehem Mines Corp. and of the Marble Cliff Quarries Co (see Rock Products, December 31, 1921) are large examples. But there are others of smaller tonnage which are quite as interesting to the ordinary producer.

One of these is the plant of the Ladd Lime and Stone Co. near Carterville, Ga. This company's quarry produces a large tonnage of crushed stone and kiln stone which requires no washing. But there is a considerable amount of quarry waste, containing from 20 to 30% of clay, from which 75 to 100 tons of good stone is recovered daily by passing through a log washer.

Differences Between Stone and Gravel Washing

The technique of washing crushed stone does not differ so much from that of washing sand and gravel. There are, however, two important differences due to the nature of the material. The first is that crushed stone is more abrasive than gravel, owing to the sharp edges of the pieces. This is especially true of trap rock and some sandstones. On this account the plant units must be of material that is adopted to resist abrasion and of sufficient thickness to give a satisfactory period of wear. The other is that it is usual to find the clay with crushed rock in a form that is more difficult to remove. In some fissured rock, the clay adheres tightly to the surface of the pieces, and in other instances, the clay is so compact that it rolls into clay balls and both these forms of clay are hard to dispose of by washing. Hence crushed stone usually requires a more thorough scrubbing than gravel ordinarily requires.

Scrubbers of various types are in use. At the Marble Cliffs plant the scrubber is a cylinder 20 ft. long and 9 ft. in diameter, revolving about 18 or 20 r.p.m. It is provided with "lifters" of angle iron by which the stone is turned over and over as it works its way through the cylinder. Clay balls are broken up by being ground between the pieces of stone (a considerable part of which is in pieces of 2½ to 3-in. in diameter), and of course the surfaces of the stones are thoroughly scrubbed. The machine is a variation of the "washing can" used in the Tennessee phosphate rock fields and lately adapted to washing sand and gravel by T. L. Herbert & Sons, Nashville, Tenn. A similar machine is used by the Terre Haute Gravel Co., described in the December 27, 1924, issue of Rock Products (Annual Review number).



A stone-washing plant much the same as that used for washing gravel

The scrubber used in a number of other plants is the log-washer, introduced many years ago in the iron ore industry. It is a heavy shaft, either made of wood or built up of steel bars, which carries a number of cast iron blades or paddles. These blades are set screw-form around the shaft so that they work the stone along the trough in which they revolve as well as stir it up. The trough is set at an incline and the blades work the stone toward the high end, while jets of water play on the stone and wash the clay back to the low end. The log-washer is made both single and double. The double form is preferred.

Both these machines are continuous in their operation, dirty stone being continually fed at one end and clean stone being discharged at the other.

Washing Screens

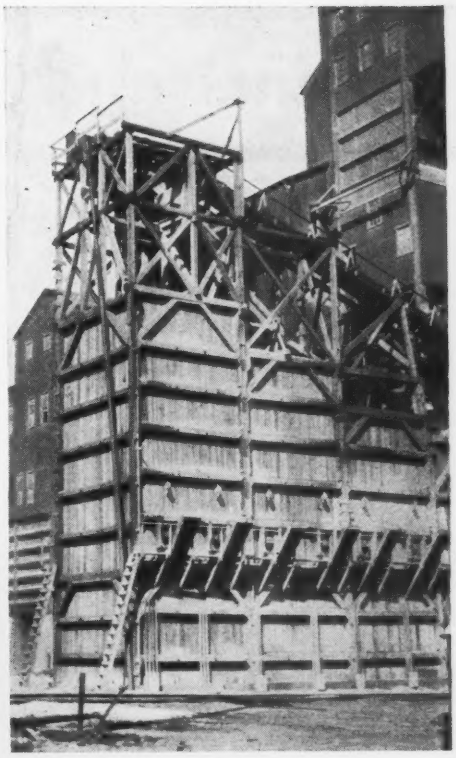
In some plants it has been found that sufficient scrubbing is given the stone by running it over a screen while jets of water play upon it. This is the practice at the Birdsboro plant referred to and it is also

the practice at the Consumers Co.'s McCook plant near Chicago. At the Birdsboro plant revolving screens are used, at the Consumers Co.'s plant vibrating screens. The work of one is apparently as satisfactory as the other, but the Birdsboro plant works on material 3-in. and finer, while the Consumers Co.'s plant works on material ¾-in. and finer. Neither machine would probably do as good work on the other's feed as it does on its own.

The Lewistown sand washer is a screw conveyor in an inclined trough resembling the log-washer except that it uses an uninterrupted screw instead of a series of blades. It is being used to some extent as a scrubber in some parts of Pennsylvania and is said to give good results, especially on the smaller sizes of limestone.

Settling Sands from Crushed Stone

Settling the sands (the sizes minus ¼-in. or in some cases minus 5/16-in.) presents problems of its own in washing stone, particularly if the stone is limestone. This is because all limestones have a slight cementing value, and in some limestones the cementation is sufficient to cause the packed sands to form a hard mass that is difficult to remove even with a pick and shovel. On this account the familiar cones and settling boxes are not to be preferred. It is better to use a device that will keep the material in slight agitation. The Lewistown sand washer is well adapted to the work on this account and so is the washer developed by the Marble Cliff company which consists of a flight conveyor in a trough, practically the same thing as the well known Good Roads Machinery Co.'s sand box. But it is essential in boxes of this kind, used with fine limestone, that the *under* side of the chain be the slack side.

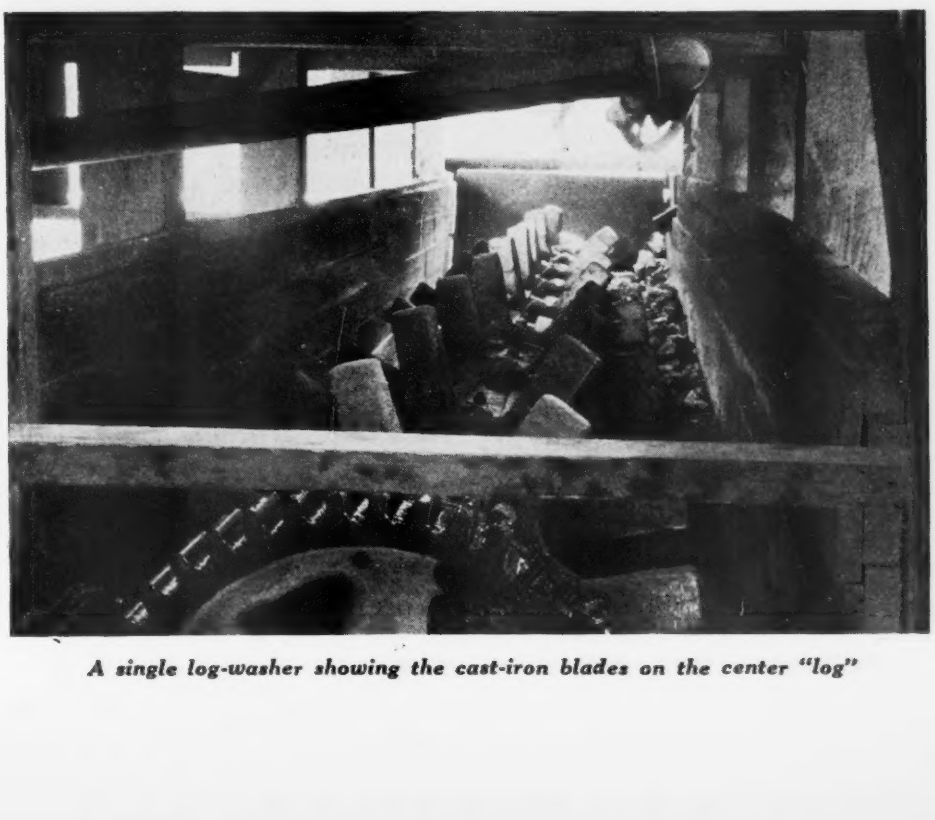


Washing plant with vibrating screens used on small sizes of limestone

The method adopted at the Birdsboro plant, which washes trap rock, is to run the sand into a concrete pit, from which the clay and water overflow, and then excavate the sand with a clamshell bucket. It seems to work well at this plant, but if the water was heavy with clay there would be some difficulty in securing a clean product.

Upper end of a double log-washer in action. The discharge enters the screen shown in front

In screening washed stone into sizes, both gravel screening and crushed stone screening practices are followed. The Marble Cliff plant has a set of Link-Belt (Dull) conical screens mounted and used exactly as they would be in a gravel plant. But the tendency is rather to use stone screens since these are heavier built and better adapted to resist abrasion. Water may or may not be used to assist in screening. If the fines are removed at first the damp, coarser sizes will screen about as well as dry crushed stone will screen, so that the screen area that would serve for a dry plant will serve as well for a washed stone plant. The method of screening most used in gravel plants (which is to take out the coarsest size first and carry the water through all the screens to the finest) may possibly give more capacity for the same screen area, but the other method (taking out the water and finest size first) works well in too many plants for one to say that it is a wrong method.



A single log-washer showing the cast-iron blades on the center "log"

Hints and Helps for Superintendents

Sand Cone for Building Stockpile

ANY of the various automatic sand dewaterers can be set up at a distance from the plant and used to build a stock pile. If there is sufficient fall from the plant the sand and water may be run to the dewaterer by a launder. If not, a pump may be installed. For handling sand this method not only works well but is fairly cheap to install and maintain.

Automatic sand dewaterer mounted to build a stockpile. The spout can be turned to build all around the base

The cut shows such an installation at the Missouri River plant of the Stewart Sand Co., Kansas City, Mo. The material handled is fine sand, about 60% of it passing 50 mesh. It is the overflow of a classifying plant used to wash and grade concrete sands. The sand and water are brought in through a pipe and run to a box above the cone There is a small screen in this box to remove any floating trash and the like and as the quantity of this to be removed is small only a small screen area is needed. The screen cleans itself, the water washing the trash along until it finally falls off the end of the screen into a box.

The spout below the cone may be swung around so that a stockpile may be built all around the cone. The sand is loaded from the piles into trucks by an electric wagon loader.

There are a number of uses for fine sand saved from overflows in this way, and if the sand producer will save the fine material and look about for a market he can usually find opportunities to sell it for a price that will pay well for the trouble and expense of saving it. Most of the fine sand sold from the stockpile shown is used for bedding cattle cars.

Small Re-screening Plant

A RE-SCREENING plant is often of great value to a crushed stone or a sand and gravel plant. Sometimes a special size is wanted in small amounts and can be made from a mixture of sizes, such as taking out the size between ⅜-in. and ⅝-in. from a product that is between ¾-in. and ¼-in. If only a small quantity is needed the cheapest way to get it may be by means of a simple re-screener such as is shown in the cut.

Another, and perhaps more important, use for a re-screening device is to insure clean material. In ordinary plant practice a certain small amount of fine material will go in with the course when it is not wanted. This is especially the case with washed material which is damp when it is screened, the dampness causing the fine grains to adhere to the coarse grains. After the material has dried the small grains are detached and are easily screened out by passing over a rescreen.

The little plant shown is at the Commonwealth Quarries Co.'s plant near Summit, N. J. The material comes from stockpiles by the belt conveyor shown. It is loaded into trucks and it passes over a gravity screen in the bottom of the wide chute shown above. The fines which are screened out fall into a hopper below and are removed as they accumulate. Since they are not in large amount this removal is only occasional.

A chute with a screen in the bottom, like that shown, is used in many sand and gravel plants for loading cars. Such screens are worth the little trouble they make in the way of attention for insuring a clean product.

Gravity Screening Tower

GRAVITY screens in the rock product industries are mainly confined to sand and gravel plants in connection with pump dredges. Such screens are set almost flat and the wash of the pump discharge carries the material across the screen.

For dry material the screens have to be set at such an angle that the material will roll. Screens of this kind in series have been used to some extent in crushed stone

A rescreening plant for cleaning stone or gravel

plants. About the simplest way to install such a set of screens is to place them one above the other in a tower. The oversize of one screen falls on the head of the screen below, which is of a coarser mesh than the preceding screen. The screens are set zig-zag, so that if the first slopes to the left the second slopes to the right and so on.

The picture shows such screening tower in a plant at Cartersville, Ga., belonging to the New Jersey Zinc Co. The material handled is barytes, from about 1-in. down to "sand-size." It is damp, as it is washed material coming from the jigs, but there is not enough water to assist in the screening. The dampness rather makes the screening harder than it would be if the material were dry.

Thomas A. Edison studied this type of screens a number of years ago and laid down some rules for their successful operation. One was that they worked better in series if the finest size was taken out first. The rolling of the coarse oversize over the screens sets up a vibration that keeps the screen from blinding. Another was that the meshes in the screen should be longer in the direction of the motion of the material. This is especially true of the finer meshes. By carefully studying this type of screens Mr. Edison secured high efficiencies from them.

With the coming of the electrically vibrated screens which are much more efficient area for area, and with the improvements in revolving screens, the use of gravity screens of this kind has rather declined than increased. The reason for including an installation of the sort in the Hints and Helps department is that this is a very successful installation of such screens and the tower method of installing them is a good one.

Gravity screening tower. Material is brought in by the conveyor in front

Fence of Old Pipe and Rope

MANY uses can be made of old pipe and rope, and a number of them have been shown in these Hints and Helps pages. About the best use that can be made of them is to make them into some form of safety device such as that illustrated here.

The fence shown is at the Cedar Cliffs quarry of the New York Trap Rock Co., which is on the Hudson river above New York. The posts are of old pipe which are firmly set in the rock above the quarry. Old hemp ropes are laid along the top and half way to the ground and securely fastened.

This fence is in the quarry and not on a highway, and only employes pass along the path shown. It is not usual to provide any fence at such a place, but it is well to do so.

Old pipe and rope make this fence which is placed along a footpath above a quarry

Causes of Conveyor Belt Wear

AT a coke plant, rubber conveyor belts were run side by side, some being covered in from the effect of sun and rain and others being allowed to run in the open. The belts covered in lasted five years, while those in similar service in the open lasted three years.

A belt that was carrying wet sand was so installed that the edges were rubbed off. The water got in between the plies and the plies came apart so that the belt was destroyed in a short time.

A belt carrying crushed rock had its ends not cut square at the splice. The belt ran crooked, the edges wore off, and the plies came apart.

A belt at a crushed stone plant was found to be wearing out rapidly. Investigation showed that it had been put on upside down, with the rubber cover (designed to resist wear) next to the pulleys.

A cement company used a belt that was not designed for hot materials for conveying hot clinker. The rubber dried out and the plies came apart.

A belt with a tripper distributed wet gravel to a row of bins. The tripper had no brush and the lower pulley forced sharp pebbles into the belt.

Some other causes of excessive belt wear have been found to be:

Injury to belt in putting it on, cutting the edges or the cover.

Too long or badly set skirt boards.

Pulleys too small. Excessive bending makes the plies come apart.

Excessive tension. The belt stretches and the splices pull out.

Oil or grease dropping on belt. The rubber softens and becomes loose.

All these are taken from Hetzel's "Belt Conveyors and Elevators" and there are many more sources of excessive belt wear. But it will be noted that they can all be grouped under two heads: Carelessness and Ignorance. Carelessness is shown in not looking after the belt while it is in operation, for anyone can usually see whatever is injuring the belt and remedy it before too much harm is done. Ignorance is shown in improper installation of the belt or in using the belt for purposes for which it was not intended.

Manufacturing Problems of Cement Industry*

A Paper Read at the New York Meeting of American Institute of Mining and Metallurgical Engineers

By John J. Porter
First Vice-President and General Manager, Security Cement & Lime Co., Hagerstown, Md.

THE requirements of the standard specifications under which portland cement is sold have materially increased within the past 10 years, but practically all companies are now furnishing cement better than these requirements; in some cases exceeding them by nearly 100%. From a sales standpoint, it is desirable to have a product that is uniform to a high degree and free from occasional quality troubles. A failure in quality, even if it affects only a few hundred barrels out of a yearly output of a million or more, is apt to be talked about in the trade and to affect the salability of the entire output. For these reasons, there has recently been great activity along the lines of quality control and improvement; and some of the most interesting problems of the industry are in this field.

From the manufacturing standpoint, the quality of cement is chiefly a matter of uniform and proper chemical composition of the raw mix fed to the kilns plus proper burning in the kilns; the fineness to which the cement is ground, the proportions of gypsum, the method of seasoning, and the like are contributory factors.

Uniform chemical composition of the raw mix has been one of the most difficult problems to solve. Most plants will use from 1000 to 3000 tons of rock per day and in but few cases is this material as it lies in the quarry even approximately uniform in composition. The problem, then, is to quarry and mix this raw material in such a manner that every handful passing through the kilns will have practically the same analysis as every other handful. To accomplish this purpose there are two methods of preparation: the wet process and the dry.

In both of these processes, a stone storage is the first requisite for a successful plant. This storage may handle the stone before or after crushing; its capacity may vary from two to three days' up to several months' supply, but it should be so designed that it can be filled as desired by the chemist and drawn at such points as will give a mixture of the various kinds of stone coming from the quarry and a reasonably uniform material going to the mill. The size of the storage and the exact method of handling should be varied according to the nature of the material.

Following the stone storage, the two methods of manufacture diverge. In the wet process, the raw material is ground with enough water to make a thick slurry, which is stored in tanks and stirred so that the contents of any one tank will be absolutely uniform. The chemist, after analyzing each tank, can then mix the slurry so as to obtain a raw material for the kilns of practically uniform composition. In the dry process, the storage tanks are arranged so as to be filled in rotation and drawn together, thus ironing out the variation occurring from hour to hour in the stream of material; the final stage in this mixing process is usually storing in what are known as silo tanks, the ground raw material before it is fed to the kilns. As each tank is filled, it is sampled and analyzed; two or more of these tanks are then drawn together in proportions to give exactly the composition required in the kiln feed.

After many years of experience with these processes there is a wide difference of opinion among cement-mill operators as to their relative merits. It is generally conceded that it is somewhat easier to obtain uniformity of mix with the wet process and there is some advantage in the cost of grinding the material wet. On the other hand, there is a decided economy of kiln fuel in the dry process and, in the writer's opinion, the full possibilities of obtaining uniform material through use of a series of mixing bins in the dry process are not generally appreciated or realized.

Effect of Variation in Chemical Composition

The raw material fed to the kilns must be uniform in composition and of the right composition. This might seem to be a simple matter, but small differences in the proportions of the lime, silica, alumina, iron, and magnesia are inevitable; further, what is the right composition at one mill is not necessarily the right composition at some other. In other words, the proper chemical composition for high-quality cement apparently depends, to some extent, on the nature of the raw materials being used. The reason for this fact, if it is a fact, and the exact relations involved are not well understood, but it is probably these factors, which can only be worked out by experience, that are largely responsible for the quality difficulties of so many plants during the first year or two of their operation.

The effect of some of the occasional, but less common, constituents of limestone on the quality of cement is not thoroughly understood. It is believed that the presence of appreciable amounts of phosphoric acid may, at least under some conditions, affect the quality of the cement. Whether this trouble is inherent in this element or whether it is due to its combining with a certain proportion of the lime and thereby making it necessary to change the proportions of the mixture is not known. It is thought that considerable quantities of potash and soda in the raw material may also affect the quality of cement, although this has never been proved and there are only indications to that effect.

Importance of Correct Burning

The degree of burning is a quality factor of the greatest importance; and is the one thing, perhaps, most frequently causing trouble. As fuel is one of the major items in the cost sheet, there is naturally a tendency to economize as much as possible in its use; occasionally this leads to a degree of underburning that affects the quality of the cement made. This is particularly the case as there is no satisfactory method of measuring or recording and, hence, of standardizing the degree of burning. The methods generally used to check up burning are visual inspection of the clinker as it issues from the kilns and a test similar to the soundness test on cement made on the ground fresh

clinker. Attempts have been made to use radiation pyrometers to measure the temperature of burning, and in that way control it. But, the burning of clinker is a function of time as well as temperature; in fact, it is by the time of exposure that the degree of burning is ordinarily controlled, the temperature being nearly constant and fixed by the nature of the fuel and the conditions of its combustion. There is a wide range between the minimum degree of burning which will just get the cement past the specifications, and the maximum degree which will produce the best cement that can be made from a given material. Any burning in excess of the latter is overburning; overburned clinker will grind into perfectly good cement, the only objection to it is from the standpoint of cost. There is a danger in underburning, however, and one of the most interesting and important problems of the industry is to establish means of control that will enable the operator to know for a certainty when he is burning at the most economical point.

Research Work Now Being Done

An interesting problem is the possibility of producing a supercement, one having a a materially greater strength than is now the practice, by carrying the lime in the mixture a little higher than at present, burning correspondingly harder, and grinding much finer. Much work has been done along this line, especially in Germany, but there is much more work to be done. Within the past year, a research organization, supported jointly by the Portland Cement Association and the Bureau of Standards, has been established to study the fundamental chemical problems of cement. It is hoped that the result will be a better understanding of many things that are now puzzling the practical operating men of the industry.

Factors Affecting Cost

The principal factors in the cost of making cement are in the approximate order of their importance, labor, fuel, power and repairs; the principal operations into which these factors enter are quarrying, crushing, grinding and burning. Rapid progress along the line of cost reduction has been made during the past decade. Ten years ago, somewhat over one man-hour of labor was required to make a barrel of cement; at present the average is only a little over one-half man-hour, as a result of the use of larger units, improved machinery, and the standardization of methods. The introduction of waste-heat boilers has also resulted in a material saving in cost at many plants. With this equipment, power can be generated at a cost of from 0.6—0.8 c. per kw.-hr., a considerable reduction from the usual cost when using coal-fired boilers. In other words, the use of this equipment has reduced the total fuel consumption approximately 50 lb. per barrel.

The effect of this technical progress is to be seen in the relatively lower price of cement, compared with other structural materials. There was, of course, a great increase in the price of all building materials during the war and in the subsequent period but statistics compiled by Government bureaus show that from 1912 to 1921 the price of portland cement increased less than that of any of a large number of material used in building and construction, and very much less than the average of all of them.

The most interesting and valuable work on the grinding problems of the cement industry has been done by the research engineers of the Conservation Committee of the Portland Cement Association. This work, so far, has been confined to the grinding of clinker in tube-mills but it has shown the fallacy of many generally accepted ideas. For example, it has been shown that the ratio of lime to silica, iron, and alumina is the one chemical factor affecting grindability, and that the silica, iron and alumina ratio, which for so long was considered important, is really of no effect. Another exposed fallacy is the effect of seasoning on grindability. The temperature of the clinker is of great importance but starting with cold clinker, exposure to the elements, resulting in increase in "loss on ignition," is detrimental to grindability.

A number of important problems relating to grinding remain to be solved. The exact operation of temperature, in its effect on grinding of clinker, is not understood. We do not know if the data relating to grindability in tube-mills can be applied bodily to other types of mills or whether it will be necessary to modify these data for each kind of grinding mill. Neither do we have adequate and systematic data regarding the relative efficiency of the various types of grinding mills on the various materials that must be ground. Experience in the industry would seem to indicate that certain mills may work efficiently on one material and may be very unsatisfactory at another location and on other materials.

The burning of the cement clinker is the heart of the manufacturing process and some of its most interesting and important problems are found here. Since the adoption of the rotary kiln, tremendous progress has been made in burning efficiency; but our knowledge of the process is still largely rule-of-thumb and there is great need for a systematic study of kiln operation and the reduction of its various factors to a quantitative basis.

There is no really satisfactory expression for kiln output in relation to kiln size. Attempts have been made to rate output on the basis of kiln volume, shell area, area of cross-section at the burning zone, etc; none of these methods will hold for all sizes of kilns. It is self-evident that for a given material the output will, within certain limits, be proportional to the amount of coal that can be burned per unit of time; or, in other words, to the area of cross-section in the burning zone. It is also evident that the longer the kiln, the better prepared will be the material when it reaches the burning zone; hence, less fuel will be required per unit of output and the output will be larger for a given rate of cumbustion of fuel. It is also evident that the feed end of the kiln must have an area sufficient to pass the gases of combustion at the available draft. It should be possible to work out the relationship of these various factors and to devise a formula that, for a given material and a given draft, will accurately express kiln output in relation to dimensions.

A somewhat related problem is the relationship between output and fuel economy For very low outputs radiation loss, being constant per unit of time, is excessive per unit of output; hence, fuel consumption is increased. For very large outputs, involving a high rate of combustion of fuel, the time of contact and the opportunity for heat transfer between hot gases and incoming material are lessened, hence, fuel consumption is increased. Between these extremes lies the most economical rate of production from the standpoint of fuel economy. This rate no doubt varies somewhat for different materials, but quantitative data, which are almost totally lacking at the present time, would be of great value to the industry.

One of the most interesting problems is the effect of small variations in chemical composition and nature of raw materials on the output and fuel economy of the rotary kiln. It might be supposed that with a constant chemical composition all materials would burn the same, but this does not seem to be the case. Apparently, the form in which the silica, and perhaps other elements, is present in the raw material has a most important bearing on the ease of combination; as a result, at different plants the same size kiln produces widely varying outputs with widely varying fuel economy. Even at the same plant, in many cases, the output and fuel consumption vary from week to week and from month to month, according to the strata being taken from the quarry. There is great need for a simple test for "burnability" of raw materials so that these differences can be measured and predictions made in advance of the utility of new materials. Such a test would also be of great use in existing plants in adjusting a three-component mix to the most efficient point.

It is self-evident, and has been known for many years, that the fineness of grinding of the raw material affects the ease of burning but there are not sufficient quantitative data to enable the manufacturer to calculate closely the most economical point of grinding, everything being considered. The problem of the effect of fineness of coal is being solved by the engineers of the Conservation Committee of the Portland Cement Association. It has long been supposed that the finer the coal the greater is the fuel

economy, but the committee has found that in many cases there is no advantage in grinding finer than approximately 50% through the 200-mesh sieve. Under usual operating conditions, this fineness is sufficient to burn perfectly all the coal; and when all heat units have been released obviously there is nothing further to be gained. An incidental advantage of the use of coarser coal is the greater ease of handling. In some plants, the indirect saving through relative freedom from coal floods and spontaneous combustion in coal bins is an important factor. On the other hand, the use of coarse coal has not been satisfactory at some plants where it has been tried. There are, evidently, certain conditions necessary for its success that have not been determined, but the problem will no doubt be completely solved in the near future.

There is, apparently, no such well-defined critical temperature in the operation of cement burning as exists in the iron blast furnace. Nevertheless, a high temperature is necessary and sufficient heat units must be furnished at this high temperature to make up for the radiation losses and heat carried out in the clinker. A number of experiments looking toward higher temperature of combustion, principally through the use of preheated air, have been tried; while the results are conflicting, there seems to be some advantage in this practice. A mathematical study, similar to that made by Johnson† for the iron blast furnace would be a valuable guide to work in this field.

Along the same line is the problem of the insulation of the burning zone of the rotary kiln. This has been repeatedly tried; the failure of the experiments was due to the difficulty of holding the lining. Ordinary firebrick lining owes its stability to the cooling of its outer surface by radiation from the kiln shell, and when this is prevented, its life is only a matter of a few hours. No manufacturer, so far as known, has tried a lining of radically different composition and more refractory character in combination with an insulating material in the burning zone.

The industry still has much to learn concerning kiln linings. It is customary, in rotary-kiln operation, to form a coating of fused clinker on the surface of the firebrick lining, which coating forms the real working surface. The life of the lining is, in most cases, dependent on its ability to hold a coating and, generally speaking, refractories high in alumina are the most satisfactory. There is a wide difference in cost between the various brands of high alumina kiln blocks and, as the action of the coating differs with the various materials being burned, each plant must work out the problem of the most economical lining for itself. With our present knowledge this is a long and expensive procedure because we have no correlation of the results of laboratory tests with the results of actual experience.

A most important problem in connection with kiln operation is that of getting a perfectly uniform feed of both raw mix and powdered coal. When feeding dry raw mix, the amount passed per revolution of the feed screw varies within wide limits according to the conditions of the material. Mix that has been freshly ground is still warm, contains a large amount of entrained air, and will weigh much less per cubic foot than mix that has been allowed to stand for some time in storage tanks and is therefore cold and relatively free from air. Moreover, mix feeds more freely into the feed screws while the tank above the screw is being filled; also the rate of feed varies with the height of material in the tank above the screw. Various devices are in use to prevent flooding of raw material entering the kilns but none give that perfect uniformity in rate of feed which is essential to the best output and fuel economy.

A similar condition prevails in respect to the feeding of the pulverized coal, and there is the additional disadvantage that any variation in the rate of feed makes it impossible to adjust the air supply to the most efficient point for perfect combustion. In addition to the fluctuations occurring from hour to hour, there is a fluctuation from second to second due to the action of the feed screw, some coal being pushed into the blast pipe each time a conveyor flight moves across the feedpipe outlet. Double and treble-flight conveyors are used to lessen these intervals but even then, in many cases, there is an appreciable puffing of coal at the nozzle of the burner pipe resulting in a quick succession of too much and too little air for perfect combustion.

Dust Collection and Prevention

Among the most important mechanical problems of the cement industry is dust collection or prevention. This is important from the standpoint of working conditions at the plant itself and, in many instances, from the standpoint of community nuisance. There are many sources of dust in the cement mill but the more important, in the order of their importance, are the kiln stacks, dryer stacks, grinding mills, crushers, and conveyors. There is no gainsaying the fact that the wet process has a material advantage from this standpoint. Dryer dust is eliminated, with the exception of the coal dryers, and dust from raw grinding is entirely eliminated. From the kiln stacks, the dust loss in the wet process should be, and usually is, materially less than in the case of the dry process, although this is not always the case.

Several types of bag filters and centrifugal dust collectors are available in connection with grinding mills, crushers, and conveying machines. Generally speaking, they work with a fair degree of efficiency, except where the dust is associated with a certain amount of steam. For kiln stacks, Cottrell electrical precipitators are satisfactory, although relatively expensive in both first and operating cost. In a number of cases, centrifugal collectors have been installed following waste-heat boilers. They usually catch only 60% to 80% of the dust, but are relatively inexpensive in installation and operation and, hence, are most satisfactory where they will answer the purpose. There is no satisfactory dust collector for use on dryer stacks, the combination of steam and dust being particularly hard to handle. A few attempts have been made to scrub these waste gases with water spray, but this procedure is only feasible where an abundant supply of water is available.

Among the multitude of other problems are those having to do with the life of grinding mill and conveyor parts. The rapid growth of the cement industry has only been possible through the development of grinding machines permitting the pulverizing of the enormous quantities of materials required. These materials are highly abrasive, replacements of mill and conveyor parts form a large item in the cost and the problem of better materials is important. This problem is primarily one for the manufacturers of mill machinery but, in view of the enormous variation in the life of different lots of roll heads, grinding rings, etc., the cement industry may be forced to delve into these matters and work out its own metallurgical specifications.

†Trans. A. I. M. E. (1906) 36, 454.

New Plant of the Pennsylvania Glass Sand Company to Produce Shortly

THE Pennsylvania Glass Sand Co., which operates nine plants in Pennsylvania and in the Maryland-West Virginia silica sand district, is about ready to begin the operation of its new plant near Mapleton, Penn. This new plant will be one of the largest silica sand plants in the country and in design and construction is said to embody the latest ideas in the preparation of glass sand.

It is reported that the company will abandon its plant at Grandville and old plants near Mapleton when the new plant is ready.

Gravel Rates Reduced in Tennessee

THE rates on sand and gravel on the Mobile and Ohio R. R. and the Nashville, Cattanooga and St. Louis R. R., from Camden to Henderson, Tenn., were ordered reduced from $1 to 97 cents per ton on intrastate shipments by the Tennessee railroad and public utilities commission recently, according to the *Memphis (Tenn.) Commercial Appeal.*

The order was issued following a hearing upon the complaint of the Memphis Stone and Gravel Co., in which the existing rates were declared unsatisfactory.

Modern Methods and Processes of Mining and Refining Gypsum*

Part V—Continuation of the Discussion of Calcining†

By Alva Warren Tyler

As noted in the previous article, October 4, 1924, p. 44, the calcining kettle is a crude affair considered from the standpoint of mechanical design and very inefficient from a fuel consumption standpoint. These facts coupled with the fact that continuity is fundamentally correct in practically any process of manufacture, have long directed engineers' attention to the field of continuous calcination. The fact that only one such process has been put into practical operation in 20 years and the fact that the great bulk of calcined gypsum is still produced in kettles today, indicates that the continuous calcination problem is not a simple one.

The advantages of continuous calcination are obvious; it not only simplifies the mechanical equipment, but it also reduces labor—with a possibility of greatly increasing the fuel efficiency. The drying equipment necessary (in most cases) in the kettle process is entirely eliminated. One man can operate any reasonable number of continuous calciners, while it will take a calciner and helper to every three kettles (besides a fireman where coal is used) and an attendant in any case.

Earlier practice in this process was based on the theory that crude rock could be introduced into a rotary kiln and heated well above the normal calcining temperature, after which it could be discharged into a "soaking pit" or bin, there to remain a sufficient length of time for the temperature to become equalized throughout the mass and produce a properly calcined product. By having a bin of sufficient size and a properly arranged uniform feeding mechanism at the bottom taking the material away at the same rate as it was being introduced by the kiln, or by having bins arranged for alternate filling and emptying, the period of residence within the bin could be quite closely regulated. However, as would be expected, a considerable quantity of fines would always accompany the coarser rock with the result that an ununiform product was obtained, the interior of the large rock probably being under calcined while the finer material was quite likely to be overcalcined. To overcome this difficulty, uniform crushing and sizing was resorted to, or as nearly uniform as practicable; that is, the crude rock was crushed by means of simple single-speed rolls so as to produce as few fines as possible and at the same time produce coarse material of a uniform size. In modern practice the rock is reduced so that all will pass a ⅝-in. to ¾-in. ring. Pulverized coal has proven to be a very satisfactory fuel not only from the standpoint of temperature control, but because its use gives no appreciable discoloration of the plaster.

Continuous kilns for calcination of gypsum as operated at the present time are very similar to an ordinary cement kiln; in fact, the shorter cement kilns, used a few years ago, have been successfully employed for this purpose. The kiln is, of course, lined with a refractory material with as high abrasive resistance as possible. Fig. 1 shows a modern installation using the ordinary cement kiln type of machine. The unique feature about this installation is, that although situated in western New York State, subject to quite severe weather conditions, no housing is provided.

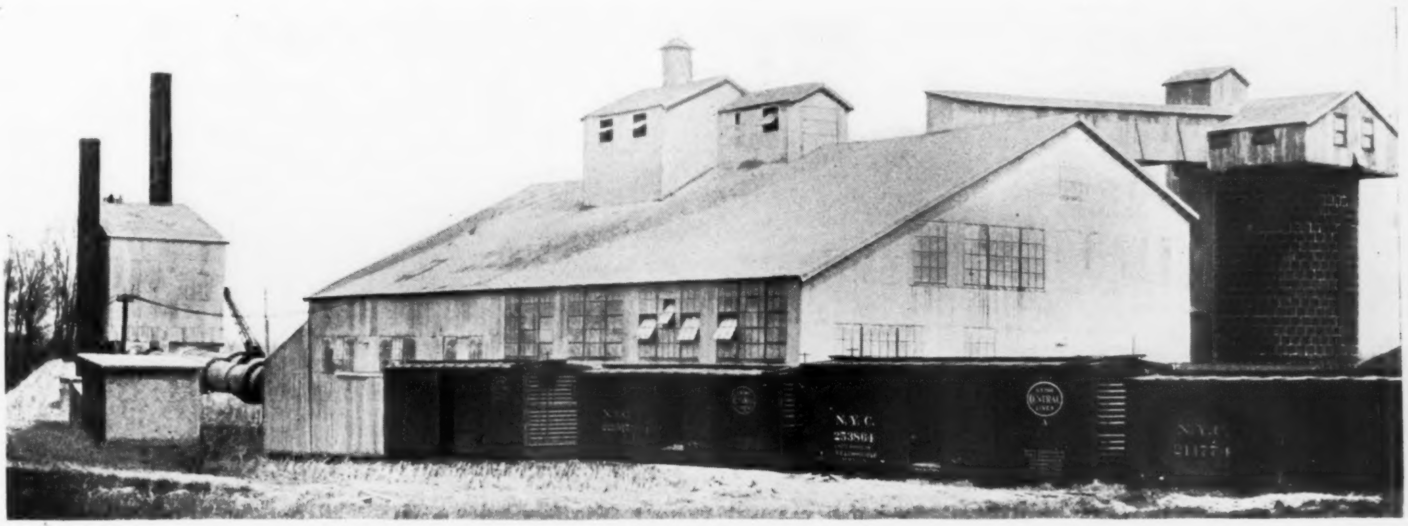


Fig. 1—Gypsum plant using a short cement type kiln (left) for continuous calcination

With uniform sizing of rock, as described above, and with proper temperature control, as may be had by use of pulverized fuel, it is possible to produce a satisfactory product. One particularly interesting feature regarding plaster produced in a rotary calciner, is that it is very fluffy and more bulky than that produced by the kettle process.

While calcined gypsum, as produced by the kettle process, is generally conceded to be the most reliable on account of its uniformity, and while continuous calcination is not looked upon as a decided success as now practiced, it may be predicted almost with certainty that the continuous process in some form will ultimately supercede all other methods of calcination.

When calcining by this process as now

†Discussion of calcining was begun in Rock Products, October 4, 1924.

practiced, the calcined material is discharged into elevators which in turn deliver it to alternate bins, one bin feeding to the grinding machinery while the other is filling and cooling. It will be noted that with this process all grinding is done following calcination—the grinding machinery receiving the material through automatic feeders from the bins referred to above. Mills using the air separating system should not be used for grinding in this case except when a short working, quick setting plaster is required (as would be true when producing for blocks, plaster board, wallboard, moulding plaster and like products), since aerating at this stage has the effect of artificial ageing. For the regular run of wall plasters, in which plasticity is one of the principal qualifications, tube mills should be used.

Fig. 2—A modern warehouse, 1200 tons bulk stucco capacity with floor storage for baled hair, wood fibre, lime and other ingredients used in mixing

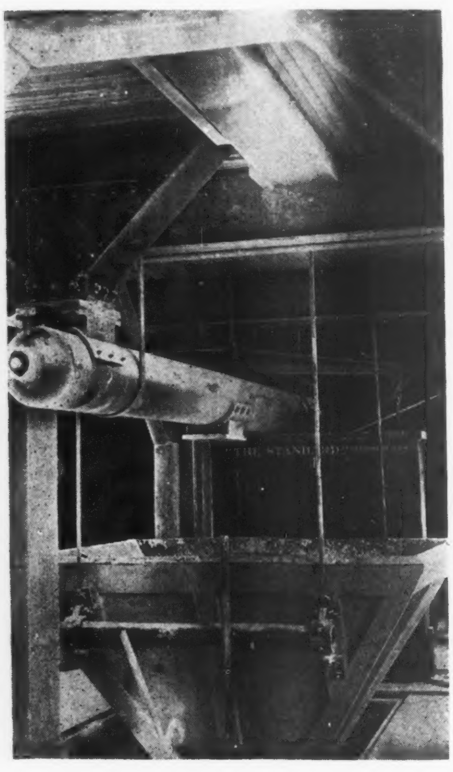


Fig. 3—Weighing hopper installation. The hopper above will give accurate weights, but is not automatic

The discharge from these mills would be delivered by means of elevators and conveyors directly to the warehouse bins, from which point the methods are the same regardless of the calcining process used or whether rock gypsum or gypsite is the raw material.

Modern mill designers favor comparatively large bin capacity in the warehouse for the stucco, for, as in the case of the grinding bin, it is necessary to have sufficient storage at this point so that there may be no interruption of warehouse operation due to any emergency caused by a shutdown of the calcining department. (See Fig. 2.) As a general rule, it may be stated that a minimum capacity for a warehouse bin should be equivalent to a full day's run of the calcining department at maximum capacity. Two days' run would be still more desirable. This minimum is appreciated when it is known that in modern practice the warehouse is operated only on a single shift, while the drying and calcining departments are operated 24 hours. This practice in the warehouse has been found much more efficient than double or triple shift operation, besides being much more acceptable to the workmen.

While a warehouse is usually thought of only as a place for storage of goods, the gypsum warehouse usually incorporates the mixing department, for the reason that the bulk of the warehouse stock is merely the raw materials used in mixing the various brands of plaster. All plasters are mixed on order, and the design of the warehouse is such that all stocks of raw materials are stored as conveniently as possible for economical handling to the mixers. It might be mentioned here that bag stocks are usually stored in a separate building or in an adjacent department properly separated from the main building by means of a fire wall, on account of the fire hazard resulting from this class of goods.

Since calcined gypsum or stucco is the principal ingredient of all mixed plasters, it is important that this material be made as economically available as possible. The logical location for the stucco bins is therefore directly above the mixers. However, due to the fact that the storage of the total bin requirement above the mixers would be a costly construction, it is the usual practice to install a supply bin, of moderate capacity over the mixers, which may in turn be replenished by means of elevators and conveyors as needed, from the main bulk storage bin which may rest on comparatively cheap foundations at approximately the grade line.

The mixing operation is an important one—as is evidenced by the fact that probably more complaints, traceable to the goods themselves, arise from improper mixing or proportioning of ingredients than from any other source. Plasters are often denounced by their users as "no good," when by proper mixing with proper proportions of other materials, they would be pronounced by those same users as "fine." This condition, of course, does not exist today in any such proportion as it did some years ago when the stucco was *measured approximately* and other ingredients were added in *about* the proper quantities. It has become well known to most operators that proper refinement or weighing and mixing equipment are matters of first importance.

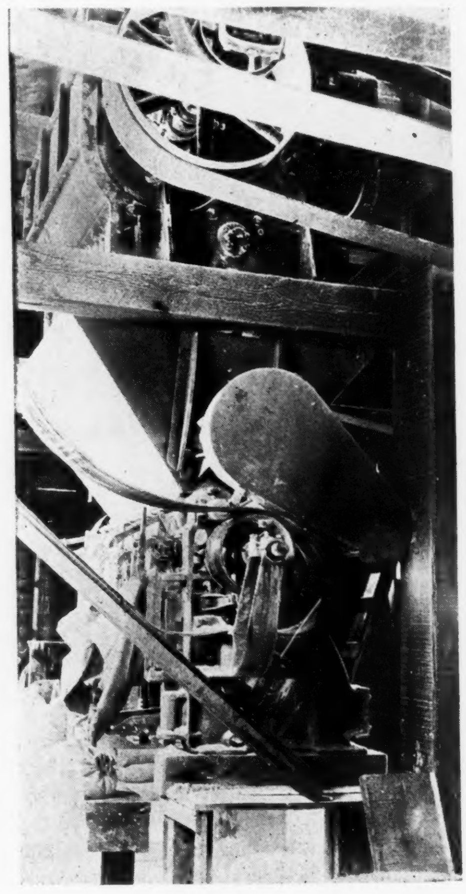


Fig. 4—Mixer (above), receiving hopper (middle), and sacking machine (below)

In modern practice a weighing hopper (Fig. 3) is placed either immediately below the stucco supply bin, or in such relation that conveyors from the supply bin may deliver to the hopper. In either case stucco is drawn from the bin and an automatic cut-off arranged so that the attention of the weighman is not required after having once started the flow of material for a given batch. The cut-off will stop the flow of stucco at exactly the correct weight, while the operator is weighing out his other ingredients, which are usually in small quantities, on separate scales. The usual charge is one ton, as this is the capacity of the mixers usually used for this class of work. The hopper discharges directly into the mixer below.

Fig. 5—Another mixer and sacking machine installation

The double cylinder mixer (See Figs. 4 and 5) such as the Broughton or Ehrsam is almost universally used for mixing fibred gypsum plasters and, from the standpoint of thoroughness and speed of mixing, is probably the best machine on the market for this work. It has two compartments, the mixing compartment and the sacking compartment. After the material has been mixed for the proper length of time, (about two to three minutes) it is discharged from the mixing compartment into a receiving hopper or sacking compartment below, from which it is separated by a set of gates which are operated by the attendant on the charging floor. As soon as a batch is discharged into the receiving hopper, it is sacked from this compartment by the sackers and after the weighing and tying of the sacks, the material is ready for shipment. It is usually delivered from this point to the cars. The mixer described above, usually has about six sacking spouts and two men will handle the sacks, and place them alternately on a weighing scale, at which point a third man will do the weighing and a fourth the tying and placing on trucks. Two men are usually required to truck the material from the mixers to the cars besides having one extra man in the car to help in piling.

The more modern method of handling the sacking operation is by the use of what is known as a sacking machine (Figs. 4 and 5). Instead of having the sacking spouts noted above, the sacking machine is attached directly to the receiving hopper in place of the spouts. The receiving hopper in this case is usually of special steel construction designed especially for fitting to the sacking machine. The sacking machine is arranged with a number of special spouts or nozzles projecting horizontally from the receiving chamber of the machine which in turn is rigidly attached to the bottom of the receiving hopper of the mixer. The receiving chamber of the sacking machine is equipped with a shaft on which are mounted a number of blades throughout its length which, when the shaft is revolved at a high rate of speed (1500 r.p.m.), serve to direct the plaster and force it out through the nozzles. Special sacks known as "valve bags" are required and are made with an opening in one corner, into which the nozzle is inserted when the bag is placed into position for filling. The opening in the bag fits tightly around the throat of the nozzle when being filled and automatically closes when removed therefrom. The closing of the bag is accomplished by turning in one corner of the bag before sewing or sealing, so that a flap or valve is formed which covers this opening tightly when the pressure of the plaster comes on it. Bags of jute are made the same as any ordinary bag with the exception of the "valve" in one bottom corner. Before using they are tied (usually with wire ties) in large numbers, often by the use of a tying machine which reduces the cost of tying to almost a negligible quantity.

Paper bags for use on the sacking machine, are completely sealed with only the valve opening in one upper corner, therefore no tying whatever is required.

In operation a bag is slipped over one of the nozzles of the sacking machine—a lever is pulled which causes the nozzle to register with an opening in the supply hopper. The small blades of the machine revolving at high speed force a stream of plaster from the nozzle, much the same as a stream of water is forced from a centrifugal pump. As soon as the sack has reached the required weight (usually 80 lb. for paper and 100 lb. for jute sacks) the nozzle is automatically thrown out of register with the hopper opening and the flow is instantly cut off; the sack of finished plaster is now ready for shipment. It will be seen that by means of this machine both the weighing and tying operations are eliminated, saving at least two and in some cases three men. In sacking gypsum plasters, either a three or four spout sacking machine is usually used.

From this point there are various methods used for handling the material when the sacking machine is used. In some cases the bags are allowed to drop directly on to a conveying belt which conveys them to some point conveniently located for loading trucks for delivery to cars. It will be seen that in the case of three spout machines, one sacker will be all that will be required at the machine and as in the case of the hand sacker, two truckers will be required to handle the sacks to the cars. Practically, an operation as efficient as this, has been used in connection with a four spout sacking machine, the sackers taking the sacks from the spouts and delivering to trucks. In this case, there would be probably two sackers and two truckers, three trucks being used in the operation, one truck always standing, being filled while the two truckers handle the trucking and placing of sacks in the cars. Another man is sometimes used in the car to take care of the proper piling of the material.

South Built 2,856 Miles of Hard Surface Roads in 1924

IN sixteen southern states about $200,000,000 was spent for improved highways, according to a report in various southern papers. A new record was set in the matter of actual mileage completed or begun, with 16,835 miles of improved roads. Of this amount, 9,141 miles were completed and the balance carried over into 1925. This mileage is 1,000 miles in excess of figures for 1923.

The percentage of hard surface roads being constructed is increasing yearly. A total of 2,856 miles, about a fourth of the total mileage for 1924, were hard surface roads. Of this mileage, 1,306 or nearly 50% were concrete.

The country as a whole constructed over 6000 miles of concrete roads.

Making Glass Sand and Polishing Sand

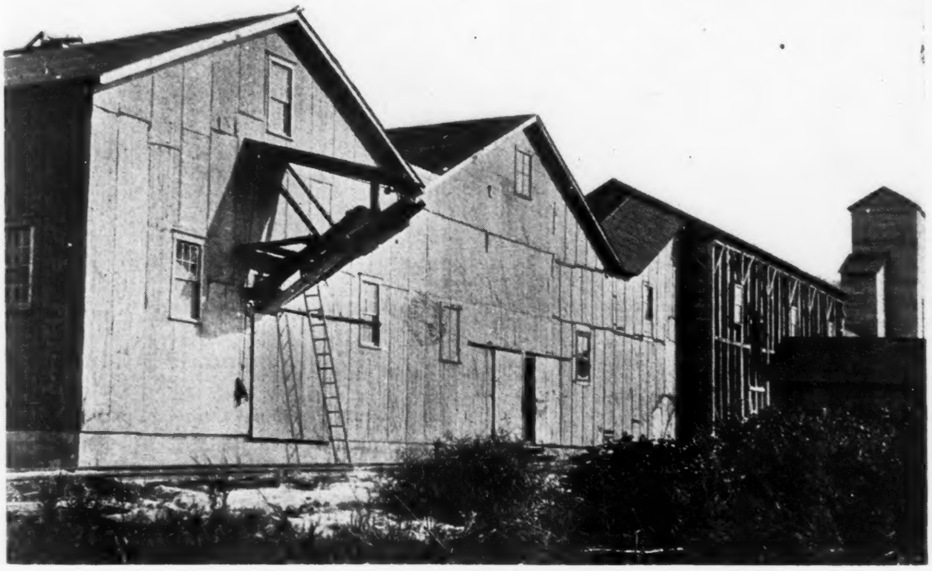
The Mifflin Sand Company's Plant, Near Lewistown, Penn., Embodies the Latest Practice in the Preparation of Silica Sand

THE Mifflin Sand Co. operates one of the newer plants in the well known silica sand producing district, near Lewistown, Penn. The plant is about 10 miles out of Lewistown. Although it had been built only a short time when it was visited for ROCK PRODUCTS last summer, the operation of the plant had been so successful that an addition to more than double the capacity of the plant was being built. This addition has since been completed and is now in operation.

The quarry, for the sand is in the form of a rather friable sandstone as it lies in the deposit, is about a mile and a half from the washing plant. The two are connected by an electric road which was built and is run by the company solely for this purpose. This railroad in itself is a considerable piece of engineering, since it had to be put through a tunnel under the William Penn state highway and then cross the Juniata river, which is a fairly wide stream at this point.

The face of the deposit where it has been opened is about 70 ft. high. There is a well defined body of pure white silica sand, suitable for glass sand, on one side and light yellow sand, suitable for polishing sand, on the other. Plate glass is made in this district and the making of plate glass demands about three times as much polishing sand as glass sand. Hence there is a sufficient demand for both kinds of sand in the market in which the sand is sold.

The material in the deposit might be described as a soft sand rock. It is hard enough so that it has to be drilled and shot in order to quarry it, and it is soft enough so that a great deal of it breaks up in handling and transporting it. No crusher is needed at the plant, the few lumps which exceed 6 in. in diameter being broken with a sledge.



Washing plant and dry house (at right) of Mifflin Sand Co.

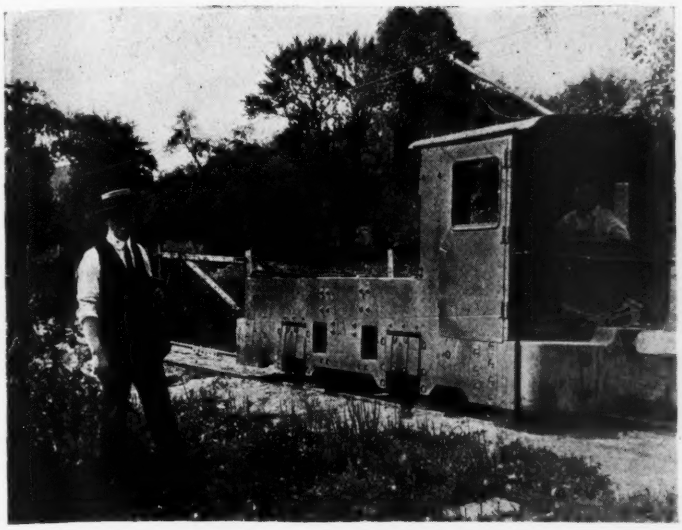
The quarry. The white sand ledge shows behind the pole

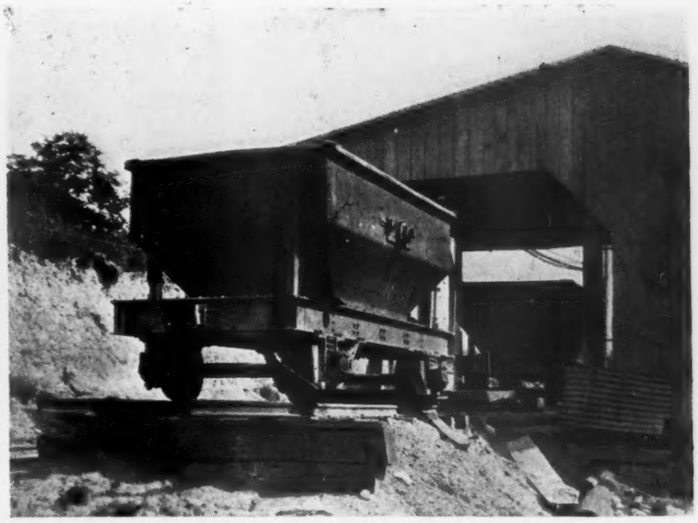
Quarry Practice

Air drills on tripods are used for drilling and dynamite for shooting. The sand which is brought down by a shot is loaded into 10-ton end dump cars made by the Easton Car Construction Co. of Easton, Penn. Recently some cars made by a company at Bellwood, Penn., have been added to the equipment, these cars having a special arrangement for braking by hand and being made with an unusually rigid frame.

The shovel used for loading is a Marion, electrically powered, with a 1¾ yd. dipper

The cars are pulled by a General Electric direct current locomotive in trains of three to five cars. The track gage is 44 in. and the rails are 60 lb. The road passes under the highway through a concrete lined tunnel. After passing a short level stretch it goes on to the bridge (built by the American Bridge Co.) and passes on to a long fill. By fills at both ends of the bridge the track has been brought in above the plant bins. This makes the road a pretty piece of engi-





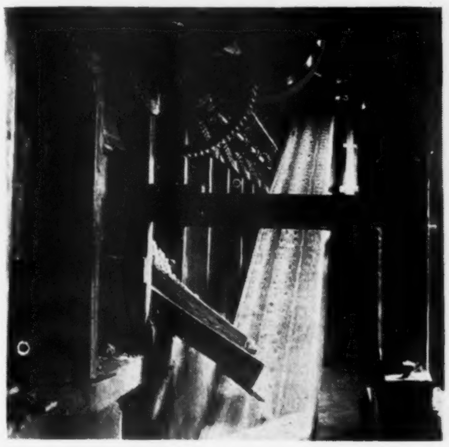
Left—Edwin Cross, designer of the plant, and electric locomotive. Right—Special car built for service between plant and quarry

neering, as it was carefully figured to bring in the material from the deposit at the right height as well as at the right place without any excessive grades.

The Plant

There are two plant bins, each holding 100 tons, and each supplies one of the two units into which the plant is divided. These units are practically duplicates, except that one has eight 22-in. Lewistown sand washers, while the other has 12.

From the bin the crude rock passes through a grating that will permit only 6-in. lumps and finer, larger pieces being sledged. The rock then goes to a chaser (Lewistown) mill, which is what has been long known as a Chillian mill in mining and as a "wet pan" in the clay industries. The mill has two edge-runner rolls on a horizontal shaft which turn on a circular track in a pan 9 ft. in diameter. Turning in this comparatively small circle the outer edge of each roll has to run faster than the inner edge, so that the roll has a rubbing action as well as a crushing action. The effect is very good



The belt conveyor carries wet sand on a slope of 7 in. to 1 ft.

in breaking down the structure of the sand rock and thus reducing it to sand.

The discharge of the mill is through perforated steel plates, with ⅞-in. round holes, set at 45 deg. inclination around the track on which the rollers run. The action of the rollers on the mixture of sand and water in the pan helps to force the crushed material through these perforations.

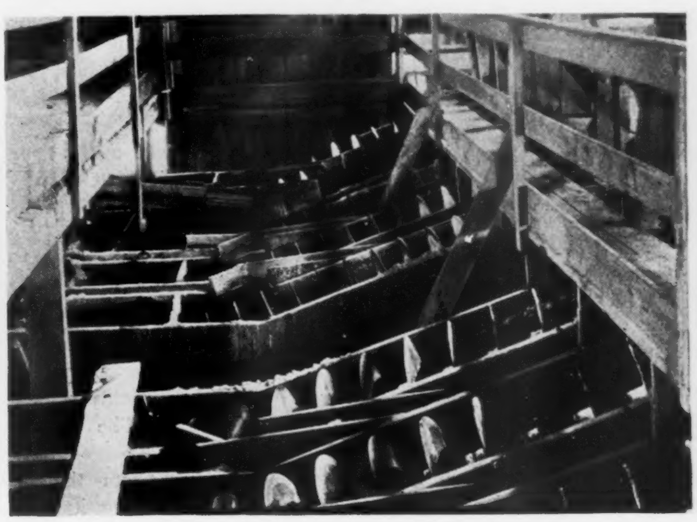
Screening Practice

The mill discharge goes to two Lewistown revolving screens set one on either side of the pan. These screens are short cylinders covered with 10-mesh wire cloth. Each is 6 ft. in diameter and 30-in. wide on the face.

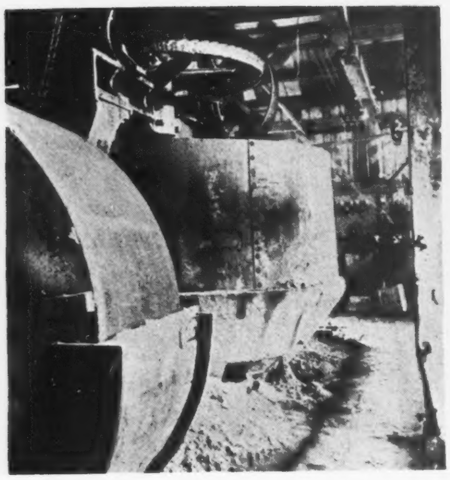
The oversize is carried up on the inside of the screen by paddles, or lifters, about 6-in. wide, and from these it is dropped into a chute where it meets a stream of water that washes it back into the pan.

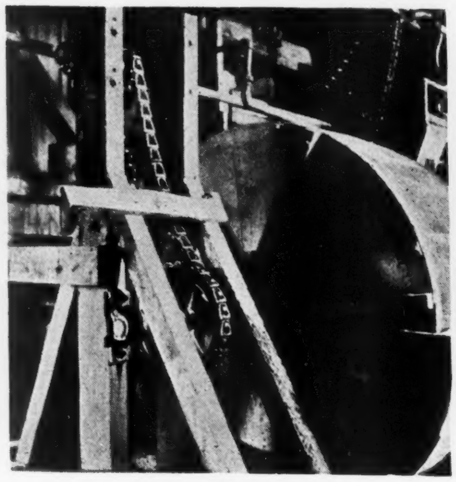
The capacity of one of these units of a chaser mill and two screens is easily 45 tons an hour.

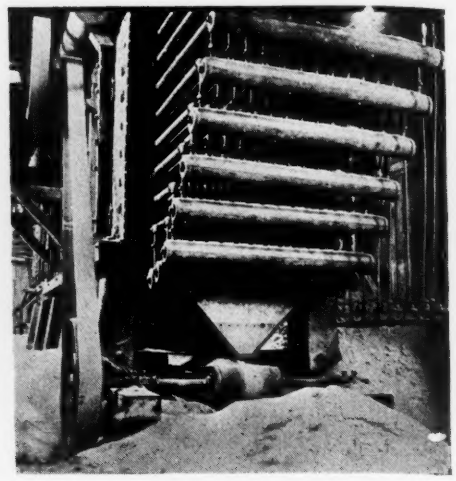
The undersize of the screen, with the water which accompanies it, passes into four Lewistown sand washers, which have screws 22 in. in diameter. This is so well known a machine that it hardly pays to describe it here any more than to say that it consists of a screw working in an inclined trough. The screw carries the sand out of the water



Left—Bridge over Juniata river, built for the company's road. Right—Part of battery of sand washers







Left—The chaser mill and part of screen. Center—One of the two screens that go with each mill. Right—End of steam dryer. Note sand falling from conveyor underneath

and deposits it nearly dry at the top of the incline.

Rewashing

From the first set of sand washers the sand passes to a second set for rewashing and rinsing. The overflows of all the sand washers are sent to waste.

The dewatered sand falls into two screw conveyors, one right and one left hand, which bring it to a central chute from which it falls on a conveyor. This conveyor is a flat belt having the extraordinary inclination of 7 in. to the foot. One wonders how the sand stays on it. But it does stay and is carried by the belt to the draining room, which is a big open bin having a belt conveyor in a tunnel at the bottom. Above this tunnel is an 18-in. wide slot covered with castings which are shaped like a roof to send the water to the sides of the bin.

The drained sand is recovered by lifting one or more of these castings and allowing the sand to fall on the 18-in. belt below. The belt takes it to the dryer, if it is glass sand (which has to be dried before it is shipped) or to a short cross conveyor if it is polishing sand, which is always sold in the damp state.

Unusual Belt Conveyors

The conveyors, which were designed by Mr. Cross of the Lewistown Foundry and Machine Co., are so unusual as to deserve especial description. The belts are all run flat and are wide enough to carry the load without troughing. They are supported on hollow cast iron rollers 10 in. in diameter and a little wider than the belt. A 1 15/16-in. steel shaft passes through these rolls and into a plain cast iron bearing on the frame of the conveyor, which is provided with a grease cup for lubrication. Both carrying rolls and return idlers are of this same design.

Steam Dryers

The dryer, also of Lewistown design and make, consists of nine sets of steam pipes in a brick casing. Each set of pipes is horizontal and is connected at one end to a header which is supplied with its own valve for the admission of steam. The outlet end of each set of pipes is also a header which has an independent valve for allowing the water of condensation to drain out. A master valve at the inlet end controls the admission of steam to all the headers.

The effect of this arrangement is that the heat of each set of pipes may be varied independently of the others, so that heat may be applied to that part of the body of sand in the dryer which most needs it, thus avoiding the waste of heat.

The sand as it dries trickles down through these pipes to openings in the bottom of the dryer, but it will not run out unless it is dry. Anyone can understand why who has ever dried wet sand in a pan. Until the last of the moisture has been driven off, the sand stays in lumps and balls, but it will run almost like water when it is dry if it is hot.

The dried sand goes to storage and from this storage is elevated and loaded into cars.

A New Unit of Increased Capacity Planned

The concrete foundations for the new unit were being placed in the latter part of July. It was expected to be ready in a few months. This new unit will be like the others except that it will have Lewistown sand washers with 30-in. screws. These are the largest that have been made and it is expected that they will considerably increase the production over that of the other units.

The entire plant and transportation system was designed by Edwin Cross of the Lewistown Foundry and Machine Co.

The offices of the Mifflin Sand Co. are in Lewistown. J. H. Miller is president and principal owner. H. S. Settler is in charge of all operations.

All machinery is run by Westinghouse motors. The company has its own motor-generator set (General Electric), taking power from the Penn Central lines and transforming it to direct current for operating the railroad.

Janesville Sand and Gravel Co. Plans Improvements

IMPROVEMENTS entailing an expenditure of $80,000 for this year are planned by the Janesville Sand and Gravel Co. at the Janesville plants and in Milwaukee, Wis., according to the *Janesville (Wis.) Gazette.*

Extensive changes will be made at the two Janesvile plants. New bins and screens and two cranes will be added to the equipment. One crane has already arrived and the other is expected March 15. One crane will be used for the loading of storage plants and the other will be engaged in stripping operations.

A new yard is being established in Milwaukee with the purchase of 10 acres of land near the city limits. The yard will have a storage capacity of 600 carloads of sand and gravel.

E. G. Brown is yard manager of the Milwaukee plants and O. C. Hubbard is sales manager at the recently opened office in Milwaukee.

Cement Rates Prescribed

A FINDING of unreasonableness and undue prejudice has been made in No. 14126, Cape Girardeau Portland Cement Co. vs. Baltimore & Ohio et al., mimeographed, as to rates on cement from Cape Girardeau (Gulf Junction), Mo., to points in Illinois. The commission said the rates were, and for the future would be, unreasonable and unduly prejudicial to the extent they exceeded, or might exceed, those which would result from the use of the scale prescribed in Atlas Portland Cement Co. vs. C. B. & Q., 81 I. C. C. 1, from the Illinois mills to points in Illinois applied in the same manner and under the same formula for computing distances as applied in that case and as modified by the supplemental order of August 22, 1923. This finding, it said, should not be understood to preclude the Frisco and C. & E. I. for operating purposes from interchange at Chaffie, Mo., as at present.—*Traffic World.*

A Tentative Plan for Investigating Lime Kiln Refractories

Purpose of Research Soon to Be Made that Will Be of Great Value to the Industry

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

CASE 1. In a certain lime plant burning high calcium limestone with hand-fired kilns, it was necessary to take the kilns off the line every 37 working days for repairs on arches and lining.

Case 2. In another plant, the kiln running period was indefinite; it might be two months or 10 months, and so at times when demand for lime was the greatest, several kilns had to be taken off for repairs, thus curtailing possible production.

Case 3. In still another plant, about the same conditions existed as in Case 2; the life of the kilns was indefinite and to have sufficient kilns, to assure lime supply for maximum demand, numerous extra kilns were installed and so plant overhead charges were increased.

Case 4. In this plant, good kiln results could be obtained, but this at the expense of kiln lining; consequently conditions were made purposely wasteful in fuel and possible output was deliberately lowered to assure a reasonably long kiln running period.

These are four typical and actually existing cases. In each the cost of kiln repairs is high and in most cases they have at least one-third more of kilns than are actually necessary, so as to assure ample capacity during the peak of lime demand.

There are several reasons for these conditions, some of them not being realized at all by the lime men and others only very imperfectly understood. The reasons may be classified under one or more of the following headings:

(1) The refractory used may be unsuitable for the particular kiln and particular lime burned.

(2) The kiln may be poorly designed or poorly constructed, so even if the refractory is good, it, due to other causes, may begin to deteriorate.

(3) The bonding material used in applying the refractory may be unsuitable.

(4) Heat application may be such that unnecessarily high temperatures are developed at improper points.

(5) Kiln operation may be careless.

Summarizing the factors still further, they may be grouped under the three general headings: Refractory, Kiln Design and Kiln Operation.

Lime men have studied refractories for as long as they have burned lime; that is, they have tried different types of brick, but all these trials were unsystematic and if one brick proved better than another, the reasons were not known. Even manufacturers of refractories themselves did not understand the principles involved and they still are selling their brick on the basis of its fusibility when heated by itself, as if that could mean anything.

All the above the writer realized and decided to make a study of the subject, but at the same time he realized that while he had some of the necessary equipment and some of the necessary knowledge, the sum total was not sufficient for him to make a really thorough study of the subject, although his intention was to do the best that he could.

Soon after beginning the study he decided to make a trip to eastern laboratories to gather some necessary information. His first stop was at Ohio State University, where he called on Dr. James R. Withrow, professor of chemical engineering, and in charge of that department. After explaining the situation, Dr. Withrow immediately became impressed with the importance of the subject and proposed that the study of the subject be made jointly by the writer and himself, and that the information be published under the joint names. This arrangement would have been ideal on account of the complete laboratory equipment at the disposal of Dr. Withrow, his interest in the lime industry and thorough knowledge of certain of its phases and also on account of his position that would enable him to obtain information from Dr. McCaughey, a nationally known crystalographer, who also is located at Ohio State University, and probably also from the United States Bureau of Mines Ceramic Experiment Station located at the same university. Dr. Withrow's work would have been supplemented in a practical way by the writer in studying the situation in a systematic manner on the kilns of the various lime companies that employ him.

The writer's motive in attempting this work was a somewhat selfish one; while he wanted to be of service to his clients, he was paid for the service. This was not so in the case of Dr. Withrow. Under the existing conditions he could not expect any reimbursement and his offer to help was an unselfish sacrifice of his ability and time to the industry.

From Columbus, the writer proceeded east, visiting other points and finally arrived at Wilmington, Del., where he discussed the matter with Irving Warner. Mr. Warner also was interested and stated that their chief chemist, Mr. Eakins, had made a study of refractories and offered to furnish the results, which he has since done. Mr. Eakins' study, while not very extensive, will nevertheless be valuable because his was the only effort known at a systematic study of refractory for lime kiln purposes.

From Wilmington, the writer proceeded to Washington, where he visited the Bureau of Standards and explained to Messrs. Emley and Porter what the intentions were and what arrangements the writer made with Dr. Withrow. These two gentlemen also immediately realized the importance of the proposed study and offered that the Bureau of Standards, lime division, undertake such a study. Mr. Emley said he could begin work almost immediately and carry it so far that if it became evident that a new unknown brick would be more suitable than the bricks now used, they would develop such a brick.

This offer was quite a revelation. The industries, at least the lime industry, do not know what potential store of knowledge and what willingness to help they have in the various scientific institutions and their men. That a government institution, such as the Bureau of Standards with equipment worth millions of dollars and scientists counting into hundreds, should offer itself, without hesitation, without even being asked, without a chance for reimbursement, to undertake a study that may take years for completion, is certainly inspiring.

Due to the arrangement with Dr. Withrow, it was, however, necessary to inform Mr. Emley that before a decison is made, the matter must be submitted to him. The next day the writer visited the headquarters of the National Lime Association and there discussed the matter with Mr. Ford and Dr. Fink. Dr. Fink stated that some time ago the National Association of Refractories Manufacturers appointed a committee which

was to co-operate with a committee appointed by the National Lime Association with the intention of undertaking a joint study of refractories. This arrangement was not, however, fully brought under way, so no results were obtained.

While first the writer intended to do all the work himself, at this point there were more offers to undertake the work than could apparently be properly distributed. The offers were, however, of such high quality that to ignore them would mean serious curtailment of progress. Further study of the situation even brought out that work could be so co-ordinated, that there would be little duplication, but much co-operation, and so Mr. Emley was called up on the telephone and asked if he would agree to the following arrangement, subject to Dr. Withrow's approval:

(1) Bureau of Standards proceed with the work in an independent manner. They are to study the situation from a more theoretical standpoint, conduct experiments with different refractories and types of lime, under different temperatures, determine slag penetration and types of slags formed under different conditions. They are to bring out the main underlying chemical and physical factors involved and determine what effect the chemical composition and what effect the physical makeup of the refractory has on its durability.

(2) Dr. Withrow's investigations can be grouped under three separate headings:

(a) Laboratory work on a semi-practical scale. By means of miniature kilns which would have four walls made up of different refractories, he can determine relative effects on each. In such a kiln he will have a greater control over temperatures and influences, causing slagging or spalling, than would be possible in full size kilns. He could also study monolithic linings and the various brick bonding materials, effect of steam and other methods of dilution, short and long flame, etc.

(b) Since the Marble Cliff Quarries Co. have a large rotary lime kiln located in Columbus, it would be desirable that the study of refractories from a rotary kiln standpoint be delegated to Dr. Withrow. Mr. Kaufman, general manager of this company, was approached in regard to this matter by the writer and he together with H. R. Welch, general superintendent, agreed to this proposal. In this connection, it may be well to bring in also the Kelley Island Lime and Transport Co., who, in their White Rock plant rotary kiln, use special linings of such durable nature under high temperature that they were unable to insulate the hot zone of the kilns. The experimental work of the American Lime and Stone Co., who use steam in rotary kiln and thus supposedly greatly increased life, capacity and efficiency, would also come under this heading.

(c) Due to the location of the dolomite industry in Ohio, it would also be proper to delegate this work to Dr. Withrow. He could keep in touch and try in a full size practical manner the results obtained, both in his laboratory and in the laboratory of Bureau of Standards.

(d) If possible, he is also to keep in touch with the Bureau of Mines Experiment Station and the developments of their study in application of refractories to boiler practice.

(3) The National Lime Association through Dr. Fink could serve in three ways:

(a) Induce refractory manufacturers to help the investigation in a way the various investigators may desire.

(b) Make a search and compile a bibliography on the subject. To get all information that may be of value, it will be necessary to reach out into other industries. Much valuable information is published even if not under the heading of lime kilns.

(c) They are to act as a connecting link between the investigators and the members and executive committee of N. L. A. There was much experimental work done by individual lime producers. For example, H. Dittlinger used monolithic linings with success. Mr. Warner uses silica brick with success. Others tried silica brick without success. Colonel Cobb tried carborundum with success. Hunkins-Willis use air jacketed linings with success. Louisville Cement Co. had a kiln in service for six years without repairs, etc. To bring all this out will help the individual manufacturer, the industry and also naturally will greatly help the investigation.

(4) The writer's intention is to study the matter on a full size scale in the high calcium kilns, to apply results of Bureau of Standards and of Dr. Withrow and report back. His intention is also to study kiln design and workmanship of installation conducive to greatest life, to devote particular attention to the also important factor of operation, human element.

Of course not all the above details were transmitted to Mr. Emley over the telephone, only the main points of the general plan, but he stated such an arrangement will be entirely agreeable to him.

On the return trip, the writer again stopped at Columbus, where Dr. Withrow also was in favor of the above procedure. However, if necessary the plan may be modified or supplemented by any of the main parties interested.

In closing it may be said that it is very urgent that this investigation begin as quickly as possible and also that full co-operation exist between investigators. The problem has many angles, and practical experiences as well as theoretical knowledge of the highest kind is needed to assure final success. None of the men involved are such that they would not give credit where credit for work done and results obtained is due, so this need not be considered. The main point is service to the industry and if success is achieved and results applied, it will be equivalent to building several hundred new kilns for the lime industry. It will mean cheaper lime and more lime and may even mean better lime. Further, this investigation has such practical value that its success may popularize technical investigation among lime men which tend to help the industry in many ways.

Missouri Company to Mine a New Fertilizer Material

AN organization, known as the Lime Phosphate Co., was formed at Aurora, Mo., about three months ago to commercialize a deposit of natural fertilizer found five miles northwest of Monett, Mo. This company was formed on a temporary basis and leased 1250 acres of land containing the deposits which they were prospecting.

J. L. Leib, trustee of the State Agricultural School at Russellville, Ark., is familiar with the holdings of the company and states: "The geological formation of the deposits is complex. The main contact fault and fissures radiating out from same was mineralized both by precipitation and filtration. The fertilizing value of the 74-ft. prospected is shown by analysis to contain potash, nitrate, phosphate, compound calcium and aluminum and aluminum hydrate. As a fertilizer this combination, finely ground and mixed, will be well balanced and superior to anything previously known."

After the preliminary investigations, a new company was formed out of the Lime Phosphate Co., known as the Fertilizer Corporation of Pierce City, Mo. This corporation recently held a meeting of its stockholders in Pierce City and made further plans for mining the deposit. The election of officers was held and John H. Hoberg of Monett, Mo., was elected president; L. L. Allen, of Pierce City, was elected treasurer; Fred W. Volpel, of Aurora, secretary; L. E. Brougher, of Aurora, vice president; other directors, Billie Parker, of Aurora, and R. L. Beard, of Lowell, Ark.

At the present six men are working steadily at the plant, stripping the ground. Some of the machinery is already in operation and a crusher has been ordered. Buildings are to be erected soon. The deposit is about 20 ft. under the surface and will be mined, dried and crushed and will then be in marketable condition.

The company already has several orders for spring delivery and expects to make the first shipment within the next two weeks.

Midwest Concrete Products Men Form New Organization

THE Midwest Concrete Products Association in its annual convention at Omaha, Neb., disbanded and reorganized into state organizations.

The Nebraska Concrete Products Association, one of the new organizations, elected from among its 100 members: A. G. Swanson, Omaha, president; George F. Lillie, Fremont, vice president; Fred M. Helener, Omaha, secretary and treasurer.

A "Bank Plant" on the Upper Ohio River

Inland Sand Co. of Marietta, Ohio, Has a Very Well Designed Plant Operating in a District Where Most of the Sand and Gravel Is Produced by Dredging

THERE are comparatively few "bank plants," as they are always called in that section, along the upper Ohio river. The bed of the river furnishes such a large supply of sand and gravel, and the business of dredging has been organized and developed to such an extent that the working of dry deposits can hardly compete with it. However, there is a real demand for sand in this section beyond what the dredges can supply. The river deposits are largely gravel. Near Pittsburgh, gravel is being crushed to sand to supply sufficient fine aggregate to be used with the gravel, as coarse aggregate, in making concrete. And gravel is not the only coarse aggregate used. At Pittsburgh and Wheeling there are plants crushing slag that turn out large tonnages daily, and sand is used with this slag as a fine aggregate. So the "bank plant" has a very necessary place to fill.

Inland Sand Co.'s washing and screening plant

The Inland Sand Co. operates an excellent small tonnage plant just outside the city of Marietta, Ohio, to supply a part of this demand for sand. When the plant was visited last summer it had been in operation about 18 months and it had recently made a number of improvements in its equipment. The chief of these was the substitution of a Sauerman slackline cableway excavator for the scraper bucket and dragline with which the deposit was originally worked.

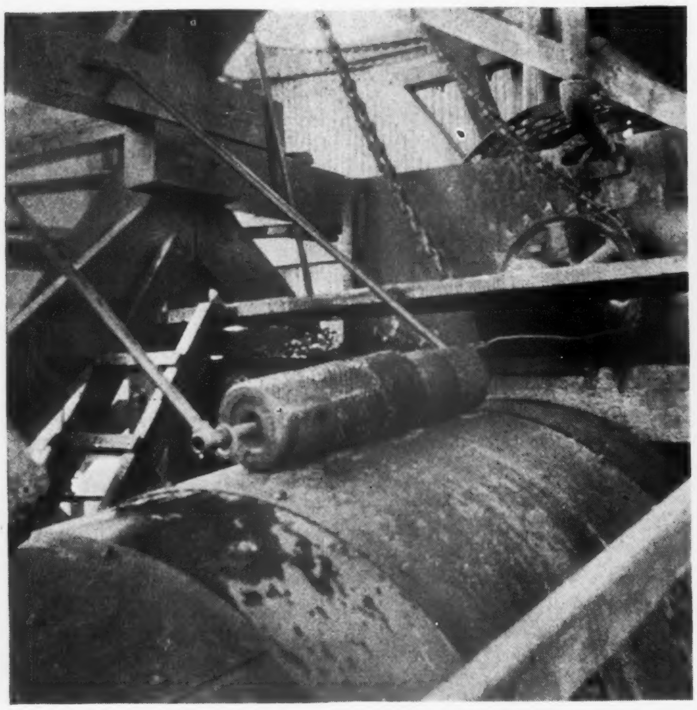
This installation is an exceptionally good one in the way the details have been worked out. The slackline cable is 1⅜-in. in diameter, all the other cables being of ¾-in. diameter. The mast is a square tower solidly built of timber and reinforced with angle irons. The steam hoist which handles the bucket is a double drum 10x12-in. Lidgerwood.

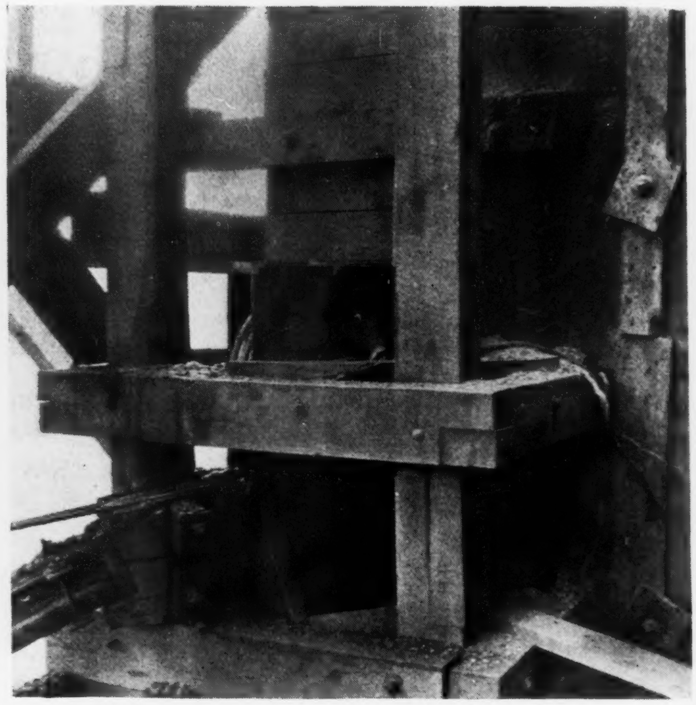
The hoist and the boilers are enclosed in a substantial building covered with steel siding. The operator sits in a little building at one side of the hoist house with his levers in a bank before him. This building looks like the pilot house of a steamboat and it has glass sides affording a view of the whole operation at the same time that it protects the operator from the weather.

The ropes are brought down from the head of the tower to two angle sheaves at the bottom before being run to the hoist. This is an unusual method but one that has advantages where the hoist is situated near the tower. The Sauerman engineers were asked as to this and said that they did not care to recommend it unless the mast and the hoist were near together. When the rope comes into the hoist at not too great an angle with the ground it is better to run it straight in from the top of the tower, avoiding the wear and bending of the rope that would come from introducing another sheave.

The span from the tower to the tail pulley is 800 ft. but the bucket does most of

Hoist house and operator's cabin which has glass on three sides





Left—The screen, which was made at the plant, and its cleaning roller. Right—Sheaves at bottom of tower

its work inside a 500-ft. span. The bucket was digging about 100 ft. below the ground surface when the picture shown was made. With this depth it has been possible to obtain an entire season's run without changing the path of the bucket.

The sand falls from the bucket into a round steel tank with a conical bottom which is a considerable improvement over the ordinary wooden bin. A gate at the apex of the cone regulates the feed from the cone to the grizzly and when this is set to correspond with the ordinary rate of the bucket it gives a very even flow of material to the plant, which means higher capacity and better washing. There is a grating on top of the tank on which the bucket dumps. This is not to serve as a grizzly but to break up lumps that might not feed well through the gate at the apex of the cone.

The pit, which is now 100 ft. below the ground level

The grizzly is made of flat bars spaced 2½ in. apart. Water is added to the material that passes the grizzly and this is supplied by a 3½-in. American Manganese Steel Co.'s centrifugal pump. This pump is at the river and it raises the water about 100 ft.

The main screen, of the revolving type, is set below the grizzly. It is a novelty in a way as it resembles the screens used in the dredges which operate on the Ohio river rather than those usually found in plants working on bank deposits. There are two long sections of ¼-in. wire cloth, then a short section of 1¼-in. wire mesh and then a section of punched metal plate with 2½-in perforations. The products of the screen are called "commercial sand," "1-in. gravel," and "2½-in. gravel."

The sand may be sent directly from the main screen to a sand box, in which it is dewatered and settled, or it may be sent to another screen covered with ⅛-in. wire cloth. The undersize of this screen is sold as plasterers' sand and the oversize, which is composed of small pebbles between ¼-in. and ⅛-in., is sold for road dressing.

The bins hold 400 tons. On account of the position of the plant, on a hillside, the bins are back a considerable distance from the railroad track below. An 18-in. Jeffrey conveyor belt of 65-ft. centers, carries the sand and gravel from the bins to the loading chutes above the cars. About 500 tons

per day were being loaded when the plant was visited.

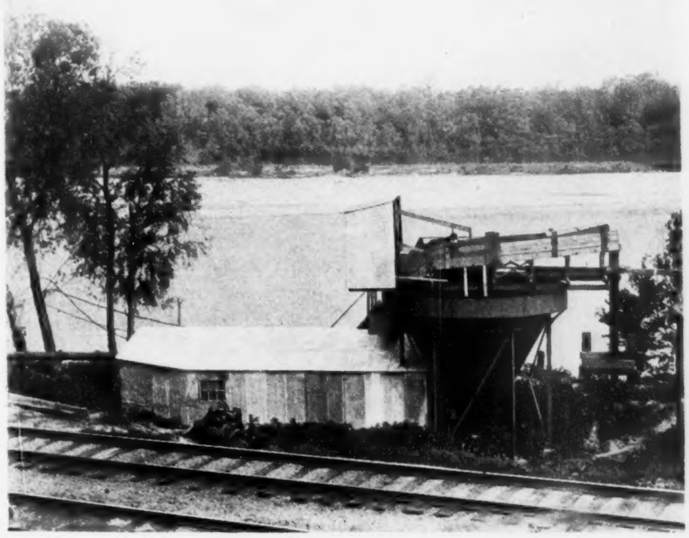
The screens are kept from blinding by a roller of a peculiar design which is shown in one of the accompanying photographs. The surface of the roller is covered with little knobs which help to force the grains that have stuck in the screen out of the meshes. This roller has been patented by L. North, one of the employes of the plant.

R. M. Harley is president of the Inland Sand Co., and E. L. Rech is secretary-treasurer and manager. The offices of the company are at Marietta.

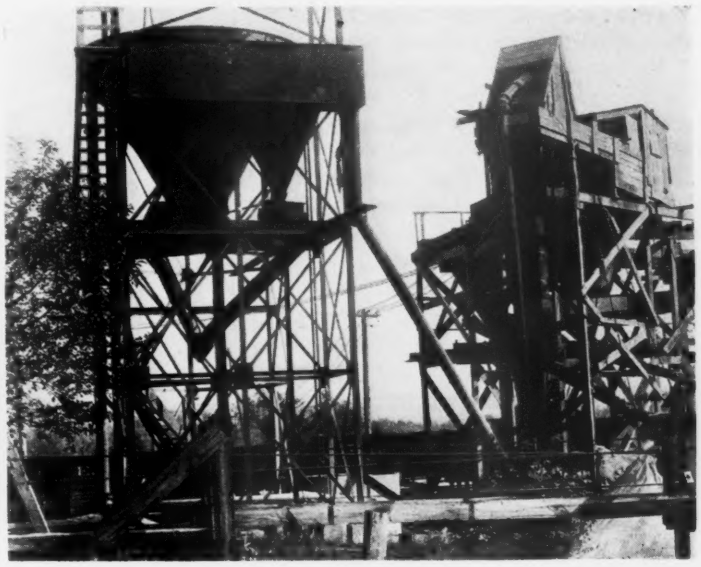
New Relay Pumping Installation on the Kaw River

Stewart Sand Company Dewaters Dredge Discharge and Re-pumps to Classifying Plant

THE Number Nine plant of the Stewart Sand Co., about 12 miles above Kansas City, Mo., on the Kaw river, stands on a rather high bluff. This alone makes it necessary to lift the dredge discharge to a considerable elevation. So long as the dredge is working near the bank the pump can make the lift, but with the addition of a long pipe line the added friction head raises the total head against which the pump must work to a point beyond its capacity.



Dewatering tank at river and pump house. The dredge discharge passes over the screen above the tank



New sand classifying system and old wooden "tipple" which has been torn down since the picture was taken

Something the same condition existed at the Number Eight plant of this company and the problem was solved by the use of a relay pump. This installation was described in the November 29, 1923, issue of Rock Products. It was so successful that it was decided to install practically the same equipment at the Number Nine plant.

The dredge which is used at Number Nine contains a 10-in. American Manganese Steel Co.'s pump connected by a belt to a 300-hp. General Electric motor. This has been found to be a very satisfactory combination for conditions on the Kaw river. Such changes of speed as are made necessary by extreme variations in the length of the pipe line can be made quickly enough by changing pulleys.

In the new relay system the dredge pumps to a conical tank on the shore and the relay pump draws its feed from this tank and pumps to a sand classifying system on top of the bluff. This sand classifying system is located on the line of the Kaw Valley electric railroad. To reach it the pipe has to cross the main line of the Union Pacific railroad and also a main highway. A large drainage tunnel (which also serves as a wasteway for the water used in the plant) permits this to be done without going above either the railroad line or the highway.

The conical tank at the river is provided with a circular overflow so that the dredge discharge is partially dewatered before it is re-pumped. On top of this conical tank is the receiving box for the dredge discharge and a ⅜-in. mesh gravity screen which separates the trash and oversize. The oversize falls from the screen into the overflow launder and the overflow water from the tank carries it back to the river.

The relay pump which takes its feed from the conical tank is a 10-in. "Amsco," practically a duplicate of the dredge pump. It is likewise belt-connected to its motor, which is a 200-hp. General Electric. The suction of the pump is connected to the conical tank at a point about 3 ft. above the apex.

The total head against which the relay pump must work figures at 92 ft. with the normal pipe line velocity maintained with the pump running at 530 r.p.m.

The classifying plant to which the relay pump discharges consists of a 14-ft. conical tank, which is practically a duplicate of the relay pump tank, and two Allen sand tanks which serve as classifiers. These are set upon a steel structure mounted on concrete footings. The conical tank acts as a receiver and partially dewaters the discharge, thus providing a more uniform feed to the classifying tanks than would be possible otherwise.

The Allen tanks load the classified and dewatered sand directly into cars or send it to a stock pile. A simple arrangement of swinging launders permits the change to be made very quickly.

The overflow from the Allen tanks goes to waste, but it contains considerable fine sand which is worth saving. An installation of two Allen sand tanks and one Dull cone has now been made and this will dewater and save the fine sand.

All of the Allen tanks have been provided with a special device for the use of hydraulic water, or clean water introduced into sand as it settles, to displace dirty water and to assist in the classification.

The Stewart Sand Co. has adopted the descriptive name of Classified Sand for its product. Practically all washed sand is classified to a greater or less extent, but the Stewart Sand Co. is one of the few that actually *controls* classification of its products so that it can produce almost any grading or size of sand that is desired.

Idaho-Montana Asbestos Mine to Begin Production

ACTIVE development work has been started on the property of the Idaho-Montana Asbestos Co., and it is the intention of the company to commence shipping this spring.

The property of this company is situated on the border line between Montana and Idaho, about 30 miles from West Yellowstone. The field is believed to contain the largest deposit of asbestos bearing rock in the world, the rock having proven to contain spinning fibre of a high grade.

The area comprises 360 acres, all of which contains asbestos bearing rock of commercial possibilities. The property was partly developed eight years ago. But discouragement brought about by the money panic which followed the wake of the war, dulled the enthusiasm of those in control of the fields and development was stopped. Within the last year active development has been renewed and the property has gained the attention of mining interests.

Announcement has just been made by the directors of the company that an initial expenditure of $400,000 is being made for the erection of a 1200-horsepower electric plant on the Madison river. A new mill will be built to contain four large crushers. The three independent units of the mill will have capacity for handling 4000 tons of rock per day, resulting in 400 tons of fiber as a daily production.

Tests of the rock show that it contains an average of 10% fiber, spinning grade, such as is in demand for commercial purposes, according to reports.

Officers and directors of the company, which is featured as being 9% Idaho capital, are headed by J. F. Kennedy, Danville, Ill., president. Mr. Kennedy is also president of the Kennedy-Van Saun Manufacturing Engineering Co., and of the Kennedy Steel and Iron Works.

J. H. Winfield of Niles, Ohio, is vice-president and Dr. Bert E. Goodman of Warren, Ohio, is secretary. The board of directors are all Idaho men, including E. R. South, who will take charge of the company's main office in New York City; Carl W. Peterson, Dr. H. H. Scarborough, all of Idaho Falls and Ezra J. Merrill of Pocatello, Idaho.

Asphalt Production Gains in the United States

BOTH the quantity and the value of asphalt and related bitumens produced in the United States increased in 1923, according to figures recently issued by the department of the interior, based on data compiled by the geological survey.

The sales by producers were as follows: Native asphalt and related bitumens, 400,236 short tons, valued at $2,885,631; asphalt made from domestic petroleum, 995,654 short tons, valued at $13,060,174; asphalt made from Mexican petroleum, 1,378,722 short tons, valued at $16,840,045.

The imports of ozokerite and other mineral waxes were 4,856,357 pounds, valued at $213,407, a decrease of more than 40 per cent in both quantity and value from the imports in 1922. The exports of unmanufactured asphalt were 72,628 short tons, valued at $1,500,869, an increase in both quantity and value. The exports of manufactured products were valued at $1,154,976

New Flooring Compounds of Rock Products

A NEW flooring that is being manufactured in Germany to a considerable extent consists of 60% gypsum, 30% magnesite and 10% kieselguhr (a form of diatomaceous earth), according to one who has just been travelling in Germany. It is said to be extremely hard and to be displacing the estrich gypsum flooring that has been so much used on the Continent. The formula is varied from that given above in cases where pure materials cannot be obtained.

Flooring of magnesite and diotomaceous earth are made in this country. ROCK PRODUCTS for February 7 contained a note of the successful manufacture of such a flooring in Nevada. It has been learned that another Nevada deposit of diatomaceous earth is to be opened and the product used in the manufacture of a similar product.

Ottawa Silica Sand Company Improves Plant

THE Ottawa Silica Co., is doing considerable improvement at its plant at Ottawa, Ill. The installation of four 350 h.p. boilers in the newly constructed power plant has been completed. A 1100-ft. well is being drilled at a cost of $6000 to supply water for washing the sand. In connection with the well the company is building a large reservoir.

What Ancient Quarry Workers Received

THERE is a record which shows that in ancient Greece in the year 280 B. C., two quarry workers were employed at a wage that would figure at 19 cents per day in our money, plus 1½ measures of wheat or three of barley for food. There was a further allowance for clothes and housing was supposedly furnished by the temple which engaged the men. This all figures out to about 50 cents per day, according to C. A. Grabill, who writes an interesting article on the subject of ancient workers in the *Engineering and Mining-Journal-Press*. Mr. Grabill figures that the ancient workman produced about one-tenth as much as the workman of today and received about one-tenth of the wages that the present day workman receives.

Calcining Phosphate Rock to Citrate-Soluble Form

IN a contribution from the U. S. D. A. Fixed Nitrogen Research Laboratory, the results of a series of experiments with a small rotary kiln made to determine the optimum conditions for the preparation of calcined phosphate are reported.

This material is made by heating a mixture of phosphate rock, an alkali salt, and carbon to a comparatively high temperature. It is a dry powdery material which may be stored indefinitely without change. It contains from 25 to 30% of phosphoric acid, of which practically none is water soluble but the greater part of which is soluble in ammonium citrate solution. It is weakly alkaline, and hence has the advantage over acid phosphate that it can be used in mixed fertilizer with calcium cyanamid.

It was found that with a charge of 100 parts of phosphate rock, 15 parts sodium sulphate, and 15 parts powdered coal, 90% of the total phosphoric acid of the phosphate rock could be made citrate soluble by heating at 1300 deg. C. for from 25 to 30 minutes. With a charge consisting of 100 parts phosphate rock, 10 parts sodium sulphate, and 15 parts carbon, a conversion of 85% of the phosphoric acid could be obtained under the same conditions.

The conversion of the phosphoric acid to a citrate soluble form is shown to be due in large part to a breaking down of the physical structure of the rock. A theory is offered to account for this action. It is considered probable that the manufacture of calcined phosphate is commercially feasible. —*Experiment Station Record.*

Kansas Forbids Electric Company to Build Line to a Cement Plant

KANSAS Public Utilities Commission has forbidden the Kansas Gas and Electric Co. of Wichita from building a line to Mildred, Kansas, to supply the Great Western Portland Cement Co.'s plant with power. This is in accordance with the policy of the commission not to permit competition in established fields, except where the companies established cannot furnish service at a just cost.

United States Gypsum Company Earnings

NET income of $7,166,381 was reported by the United States Gypsum Co. for the year ended December 31, 1924, after depreciation, depletion, Federal taxes and contingencies. After preferred dividends this was equal to $14.96 a share earned on 439,348 shares of common stock, par $20, against $5,030,922, or $15.59 a share, earned on 295,584 shares in 1923.—*New York Herald-Tribune.*

Editorial Comment

The Future of Concrete

Supposedly every one producing cement and concrete aggregates occasionally gives a thought as to what will be the future of the industry when all our important roads are paved and dwelling houses and industrial buildings are all "permanently" constructed of concrete, or concrete blocks. Fortunately, as George Otis Smith, director of the United States Geological Survey, has pointed out, the use of concrete increases with advances in civilization rather than with increases in population, and if we reflect a little on this thought we are struck by the fact that with present prospects the cement industry and allied industries, bid fair to go on developing at their present pace because of the scientific truth contained in that thought.

For example, the editor picks up a newspaper in New York to read that there is strong probability that New York State will soon issue $300,000,000 in bonds to eliminate all grade crossings in the state—millions of cubic yards of concrete must be used. The Sunday paper carries a familiar picture of elevated streets; and a continuation of the agitation for double-deck and triple-deck thoroughfares to eliminate the congested streets of this and other great cities—more millions of cubic yards of concrete. Things like these, which are visionary today, become realities under the stimulus of constant agitation and public demand, based always in the end upon sound economic principles. For example, the loss of life and man-power through grade-crossing accidents is enormous; and it can doubtless be proved that the saving in dollars and cents by grade crossing elimination will pay the interest on the investment. When economically sound, such improvements become inevitable with the passage of time and the crystallizing of intelligent public sentiment.

Concrete Aggregate

In reading over both British and American publications devoted to concrete and materials for making concrete, Rock Products is pleased to note that the importance of clean and structurally sound aggregate is being stressed again. For a time emphasis was placed upon the design of the mix. Now that seems to be fairly settled, at least for practical purposes, and the obvious fact that concrete can be no better than the materials of which it is composed has a chance to stand out again. It is to be hoped that the importance of this simple truth will be taken to heart by engineers, especially those who have charge of highway building. In some western states some disposition has been shown to "let up" on specifications for aggregate. In one state it was proposed to petition the legislature to ask for a law that would *compel* the highway department to live up to its own published specifications in buying highway material, which indicates a strange state of affairs. And in another state discouraged producers have said that they considered the time and money spent to produce material up to specifications to be wasted, as county and other engineers would buy anything that looked like aggregate, provided it was cheap enough. Of course the roads built of such inferior material will go to pieces very shortly after they are laid. Specifications for aggregate are not written from somebody's whim or fancy. They are the result of dearly bought experience with poor aggregates.

The standard specifications for aggregate have been carefully worked out by a joint committee which contained representatives of the American Society of Civil Engineers, the American Society of Testing Materials, the American Railway Association, American Concrete Institute and the Portland Cement Association. It is not to be supposed that the representatives of these bodies worked in the interest of *expensive* aggregate since they are buyers of aggregate and not sellers. Their judgment as to what qualifications were necessary came from long experience not only in mixing and placing concrete under every condition that could be found, but in observing how it stood after years of bearing loads and exposure to weather and ground waters. Every failure of a concrete road or structure after a few years of service only serves to drive home the truth the permanent concrete cannot be made unless it is made from permanent material.

Neither Boom Nor Slump

In an address to the National Distribution Conference in Washington, Secretary of Commerce Hoover said: "Without boom there is no slump. . . . No sensible business man wants either boom or slump. He wants stability. Our working folk and farmers should resent a boom more than anything else than can happen in our economic system because it means that they will inevitably get the worst of the deflation which follows." The rock products industries have been singularly fortunate in not being subject to periods of boom and depression. Examination of the figures of yearly production show comparatively small but steady percentages of increase each year in all but a few of these. Local depressions have come in certain parts of the country, notably those parts in which agricultural depression was felt, but taking the country as a whole, the stability of such industries is remarkable. The reasons for this are many but one outstanding reason is that such industries depend mainly upon themselves for investment capital and hence there is no effort to create booms for the sake of selling stock.

British Portland Cement Association Formed

THE formation is officially announced of the British Portland Cement Association, with offices at 20, Dartmouth street, Westminster, London. Its director is Brig.-Gen. A. C. Critchley, C.M.G., D.S.O., an officer whose organizing ability won him rapid promition during the war, and who has had a wide experience at home and abroad of construction and development work. Explaining the objects of the association at the opening, General Critchley said:

"The work which our association will undertake is to help the public to a fuller appreciation of the utility of British portland cement, and the main purposes to which it may be put in the form of concrete. We shall carry on the educative part of our campaign by the most effective methods available, and do everything possible to promote the development of British concrete by providing free advice and assistance for all those interested in its use—whether architects, builders, public authorities, or private individuals. In addition to placing at their disposal the services of the Concrete Utilities Bureau, which has been merged into the association, we have established an organization of traveling experts, who will be prepared to visit any locality and give help and advice, if needed, in connection with such questions as the construction of concrete houses, roads, and bridges, the uses of concrete on farm and estates, the chemical and physical testing of aggregates, the artistic possibilities of concrete, etc.

"In general, our purpose is to convince the public that concrete has an enormous number of uses which are not yet full realized, and that many economies could be effected by the employment of concrete as an alternative to materials now more commonly used. There still exists in the minds of many, who are ignorant of concrete's potentialities, an instinctive prejudice against its use. This prejudice, which is due partly to the conservative dislike of anything new, and partly to the æsthetic deficiencies of the earlier type of concrete buildings, it will be one of our first aims to remove.

"America, which within the past few years owes much to a cement organization such as ours, is 20 years ahead of us as regards concrete construction, notably in the domain of concrete dwelling-houses. Our architects were at first slow to recognize that concrete was a new material which demanded new methods of design and the evolution of an architectural style of its own.

"Our association is, it is true, an industrial association organized to promote with its own resources the interests of the concrete industry. But we believe that no great industry can flourish today which is not organized primarily as a public service. The interests of the community and our interests must be identical, and it is because we believe that the value of concrete has only to be known to create an immensely extended use that we have organized this campaign of national advertising and information."—*Contract Journal (England).*

Giant Portland Cement Co.

ACCORDING to the *Wall Street News*, the Giant Portland Cement Co. reports for the year ended Dec. 31, 1924, net income of $405,444, after depreciation, Federal taxes, etc., equivalent after preferred dividends to $12.44 a share on the 22,000 shares, par $50, common stock outstanding, as compared with $404,183 or $12.39 a share in 1923.

The income account for the year ended December 31 compares as follows:

	1924	1923
*Net profits	$458,491	$438,565
Other income	12,046	13,533
Total income	$470,537	$452,098
Int., Fed. taxes, etc.	65,093	47,915
Net income	$405,444	$404,183

*After depreciation, and local and State taxes.

Kansas May Tax Cement Raw Material

A BILL has been introduced into the Kansas state legislature taxing mineral products 2% on the cash value. This is especially intended to apply to coal, zinc, petroleum, lead and salt, but the papers say that it may be modified to include clays and shales used in making brick tile and also the limestone and clay used in making portland cement.

Peerless Portland Cement Company Moves Its Offices to Detroit

THE Peerless Portland Cement Co., according to Detroit papers, has announced its intention to move its main office from Union City, Mich., to Detroit. This decision was reached at the annual meeting, at which an increase of capital was voted from $5,000,000 to $6,000,000.

The new plant at Detroit is nearing completion and will have a capacity for 6,000,000 sacks yearly. With the present Union River plant, the total output will be 10,000,000 sacks annually.

The new board of directors is composed of Col. William M. Hatch, John Gillespie, R. D. Baker and G. W. Patterson, of Detroit; Charles S. Bush, of Kalamazoo; Jean L. Senior and Francis P. Butler of Chicago.

Officers re-elected by the directors are Col. William M. Hatch, president and general manager; Charles S. Bush, vice-president, and John Gillespie, secretary and treasurer. The general offices will be in the First National Bank building, Detroit.

Growth of Portland Cement Plants in South in 1924

SIX large cement manufacturing plants were constructed in the south during 1924. These extended from Norfolk, Va., to Fort Worth, Texas. They represent a total investment of almost $10,000,000.

The Virginia Portland Cement Co. took over the old Giant Portland Cement Co. plant at South Norfolk and is spending $750,000 in additions. The Lehigh Portland Cement Co. is making a total expenditure of $4,000,000 in the Birmingham district. The Clinchfield Portland Cement Co. brought its million-dollar plant at Coreen, Ga., near Macon, into production, with an annual capacity of 750,000 bbls. The National Cement Co. is replacing its burned plant at Ragland, Ala., at a cost of $1,000,000. The Phoenix Portland Cement Co. is erecting a $2,000,000 plant at New Orlean, La. The Trinity Portland Cement Co., which already has a $1,500,000 plant in operation at Dallas, Texas, is erecting a second plant at Fort Worth.—*Atlanta (Ga.) Constitution.*

Dock and Storage to Be Built by Universal Portland Cement Co.

CHICAGO and Indiana Harbor newspapers give details of a large construction program of the Universal Portland Cement Co. A large dock and storage plant is to be built at Buffington, Ind., near Gary. The dock is to run out into the lake from the cement plant and be used for handling coal, limestone and slag, the raw materials for making cement, and also for shipping cement.

The dock will be provided with conveyors and other material handling machinery for loading and unloading vessels and handling materials in and out of storage. The computed cost is stated by the papers to be approximately $3,000,000.

Yakima Cement Products Plant Will Be Rebuilt

ACCORDING to the *Yakima (Wash.) Herald*, the plant of the Cement Products Co., Yakima, Wash., was damaged by fire to the extent of $15,000. The company plans to rebuild the plant soon on a larger and fireproof basis. Part of the old plant, including the office and a recent annex were left intact.

Phoenix Portland Cement Co. of Ohio Changes Officers

CONTROL of the management of the Phoenix Portland Cement Co. of Ohio, exclusive of the powers held by Freeman T. Eagleson, receiver, passed into the hands of E. D. Sweetman, Texas financier, and majority common stockholder.

In spite of efforts of a few preferred stockholders, who were of the opinion their interests would suffer should control pass to the common stockholders, Mr. Sweetman elected a board of directors from his associates. The meeting was held in the Atlas building, Columbus, Ohio.

The new directors are: Mr. Sweetman, who is also president; C. A. Cheatham, who is secretary-treasurer; L. S. Gaty, Columbus; R. H. Ward and W. E. Farnan, all common stockholders.

Plan of the Sweetman group, according to their counsel, former Judge John E. Sater, is to obtain independence of the Phoenix concern by discharging the receiver and increasing the income of the company by breaking its contract with the Pennsylvania Pheonix Co. relative to operation of the cement plant at Birmingham, Ala.

C. B. Lansinger, Philadelphia, representing preferred stockholders at the meeting, contended that breaking the contract will necessitate raising thousands of dollars to operate the Birmingham plant. He said indications are that rights of preferred stockholders will be subordinated by the directors to rights of the common stockholders, with a loss to the former. He berated the fact that preferred stockholders were showing so little interest in protecting their holdings.—*Columbus (Ohio) State-Journal.*

Design and Control of Concrete Mixtures

DESIGN and Control of Concrete Mixtures is the title of one of the late publications of the Portland Cement Association. It is perhaps the best book that has appeared on the subject of designing concrete, for it takes a rather difficult technical subject and puts it in such a shape that anyone with a high school graduate's knowledge of mathematics can understand it. Indeed, he does not have to know that much to follow the method of design given, if he will consult the tables and if he knows enough to understand the curves which are shown.

ROCK PRODUCTS is pleased to note that the assumption is made at the start that the use of only clean and structurally sound aggregate is assumed, as no refinement of design can compensate for the use of unfit aggregate. From this the writer proceeds to discuss the various factors that enter into the design of concrete mixtures, the size and grading of the aggregate, consistency and the quantity of cement (the mix). Next the steps for designing a mixture are given for desired strength and slump. The difficult matter of figuring the water ratio by Professor Abrams' original formula is omitted and the engineer is told to read the water ratio directly from the curve.. Then the subject of aggregates is taken up and well discussed and followed with a discussion of the nominal and real mix. The latter part of the book is given up to field work and testing.

Strictly speaking, the book contains nothing new. Those who have kept abreast of the literature of concrete mixture design will recognize most of it as familiar. But it is put into such good shape and arranged so well that the reader will find in it practically everything that he will want to know on the subject, although the publication is only a pamphlet of 24 pages. It is to be hoped that the same material, perhaps expanded and added to, may be published in a more permanent form.

Pacific Portland Cement Co. Re-elects Directors

STOCKHOLDERS of the Pacific Portland Cement Co. at their annual meeting re-elected all of the present board of directors, who in turn organized by renaming all of the officers of the company.

It was announced that during the year just ended the corporation has paid out $460,000 in dividends, the net earnings having been approximately double that amount.

The stockholders were told by President R. B. Henderson that never before in its history had Pacific Portland Cement entered a year whose prospects were as brilliant as those looming for 1925. Among other things he informed the shareholders that the new Redwood City plant, which has been in operation since December 15, is shipping four or five carloads of cement daily.—*San Francisco (Calif.) Examiner.*

California Senator Wants State Cement Plant to Utilize Convict Labor

MANUFACTURE of cement and cement products by the California Department of Public Works, utilizing the labor of convicts, is proposed in a bill introduced into the California state senate by Senator Inman, author of the measure. The bill provides that convicts would be paid $50 a month for their work and would enjoy other benefits, including the establishment of a recreational fund. Part of the money due the convicts would be withheld to assure good behavior and to guarantee against escape from the factory. The bill, the author declares, will not be opposed by organized labor interests due to the belief that continued opposition to employment of convicts in industry is useless and that cement manufacturing is the best one to be accepted for convict labor owing to the difficulty of obtaining outside labor for this kind of work.

Alumina Cement Concrete Will Adhere to Portland Cement Concrete

WRITING to the *Engineering News-Record,* Joshua L. Miner of the Atlas Lumnite Cement Co., says that an impression is abroad that high alumina cement concrete will not stick to portland cement concrete. He says that this is not true and gives the following examples to prove it:

"First, Lumnite cement, an alumina cement, has been extensively and successfully used in repairing portland cement concrete roads and floors.

"Second, a top-coat of Lumnite cement mortar applied to a portland cement concrete base bonded to the base without any subsequent indication of separation or failure. When the slab was later broken for examination, some of the portland cement concrete adhered to the Lumnite cement top-coat, indicating that not only the top-coat but the bond itself was stronger than the portland cement concrete base.

"Third, the following tests made by Columbia University prove that Lumnite cement concrete will bond to portland cement concrete and that the bond has a high degree of strength.

"Concrete test bars 4x4x18 in. were made with one-half of the bar-length of 1:2:4 Lumnite cement concrete, and one-half of 1:2:4 portland cement concrete. The portland cement halves of the bars were 56 days old and the Lumnite halves 28 days old when the composite bars were tested. Where the Lumnite cement concrete was bonded to a rough end of portland cement concrete, the test bars developed an average modulus of rupture of 397 lb. per sq. in., the break occurring at the junction. Where the Lumnite cement concrete was bonded to the smooth end (scratched) of the portland cement concrete, the test bars developed an average modulus of rupture of 238 lb. per sq. in., the break occurring at the junction. Test bars made entirely of portland cement concrete developed an average modulus of rupture of 456 lb. per square inch at 28 days. Test bars made entirely of Lumnite cement concrete developed an average modulus of rupture of 953 lb. per square inch at 28 days.

"Fourth, the La Farge Co., manufacturers of an alumina cement in France, state in their literature that alumina cement concrete 'adheres perfectly' to portland cement concrete."

Cement Company Builds Storage for Marl

THE Virginia Portland Cement Corporation, South Norfolk, Va., is building a reinforced concrete and steel storage plant to hold a reserve of marl. The building is 80x311 ft. A machine shop 50x150 ft is also being erected.

Ohio Gravel Ballast Co. Makes Notable Conveyor Installation

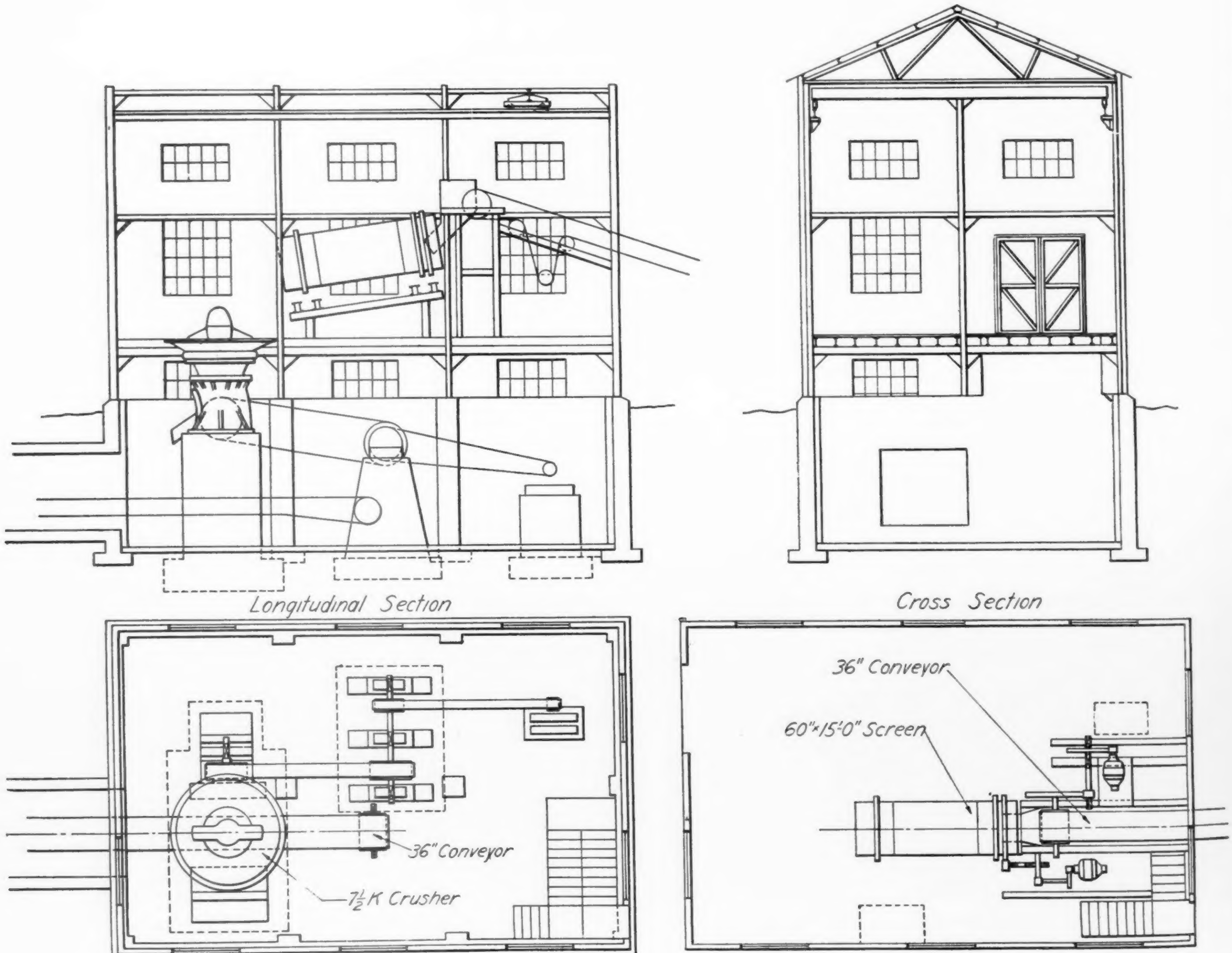
THE Ohio Gravel Ballast Co., Cincinnati, Ohio, one of the largest producers of the state, is making improvements in its Cleves plant, just outside of Cincinnati, that make it almost a new operation. In order to do this the company had to meet a problem that was much the same as the problem met by J. L. Shiely in one of his St. Paul plants, described in ROCK PRODUCTS in a recent number, the connecting of a plant on one side of a number of railroad tracks with a deposit on the other. Only in the case of the Ohio Gravel Ballast Co., the problem was complicated by the presence of a concrete highway under which the conveyor had to pass.

The deposit on which the plant was originally built is by no means exhausted, but its material is such that it mixes well with that from the deposit that is being opened. The new deposit is a larger deposit and has a larger proportion of coarse gravel than the old, which contains a considerable proportion of sand. By working the deposits in combination, the output of the plant may be varied in accordance with the demands of the market. This is important, as it permits the sale of the entire plant product without much storing of excess sizes.

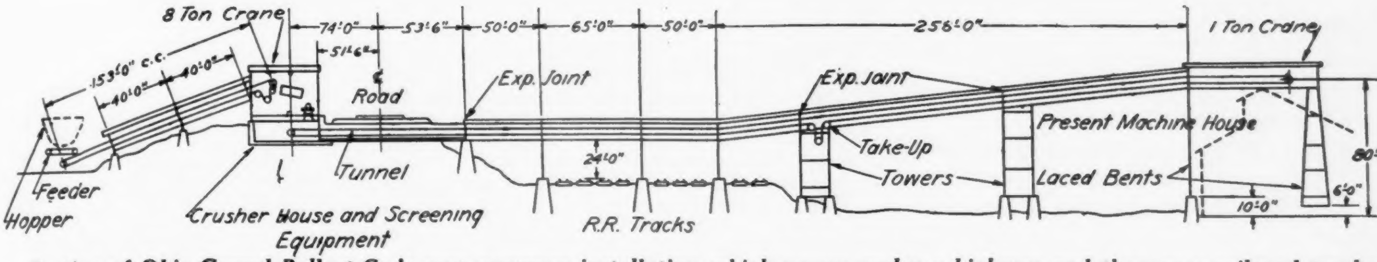
As considerable crushing is required to bring the material from the new deposit to gravel size, a primary crusher department was installed in connection with the conveyor system.

The conveyors were furnished by the Webster Manufacturing Co. of Chicago, and they make one of the most notable installations ever made in the sand and gravel field. There are two belts and both are 36 in. wide. The first is an inclined belt and takes the bank material from the field hopper to the top of the new primary crushing plant. The bank material is dug by a Marion steam shovel and drawn to the hopper, which is below the ground level, in side dump cars. A feeder delivers it to the belt and the belt to the screen and crusher in the crushing plant. After passing the crushing plant the material goes to a long belt which has a horizontal and an inclined section. The total length of this belt is 538 ft. 6 in. between pulley centers. The horizontal stretch passes from the bottom of the plant through a concrete tunnel under the highway and continues over the tracks which are enough lower than the tunnel so that the necessary clearance is obtained without raising the belt. Then the inclined section begins and raises the material 80 ft. to the top of the washing plant where there is another horizontal section to carry it across the plant.

The entire structure which carries the belt is of steel and the steel towers which support it are set on concrete piers. Expansion joints are provided in the structure, as is necessary on account of its length. An unusual feature is the placing of a 1-ton crane above the head pulley so that any re-



Floor plans and two elevations of new primary crushing plant of Ohio Gravel Ballast Co.



Section of Ohio Gravel Ballast Co.'s new conveyor installation which passes under a highway and then over railroad tracks

pairs may be easily made. It is the policy of this company to place a crane over every part that may need to be lifted, and this has been done because it is found that it pays.

The primary crushing plant is of steel and concrete construction throughout. In the roof trusses is a craneway on which is a traveling crane for lifting the heavy pieces, which was employed in installation and which will be available when repairs are needed. The flow sheet is simple. The bank material goes to a scalping screen, 60-in. by 15 ft. with 4-in. perforations. The oversize is sent to a No. 7½ K. Allis-Chalmers crusher and after it is crushed it joins the undersize of the screen to be conveyed to the main washing plant.

This plant was described in Rock Products for February 24, 1923. It is one of the best plants in Ohio and has a daily production between 4000 and 5000 tons.

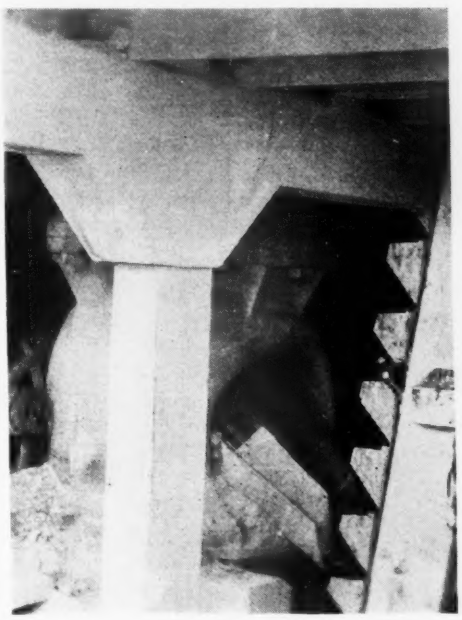
A new Marion steam shovel has just been installed to work the deposit opened by the installation of the conveyor system.

Members of the Sand-Lime Brick Association

THE group picture on this page shows members who attended the twenty-first annual convention of the Sand-Lime Brick Association held in Toronto, Canada, February 3 and 4, a report of which was printed in the February 7 issue. This association is one of the first brick associations formed in this country. It is interesting to note that sand-lime bricks are rapidly gaining favor as a quality product and expansion of the industry is inevitable.

A Veteran Rock Crusher

CONSIDERING the work they have to do and the nature of the material they handle, few machines have as long life as rock crushers. They may break, but they seldom wear out, except, of course, those



A veteran, dating from 1879

parts which are designed to wear and which are regularly replaced.

There are several veterans among rock crushers which have come to the notice of the editors of Rock Products, on their editorial journeys. Perhaps the oldest of them so far noted is a crusher in one of the plants run by the city of Nashville, Tenn., and used for making material for street pavements and highways. Cast on one side of the body are the words: "Gates Iron Works, Chicago, 1879."

The man who was in charge of the plant at the time it was visited said that he knew that the crusher had been in use since 1884 when it was first acquired by the city. Before that time he had heard that it was used in a privately owned plant that was burned.

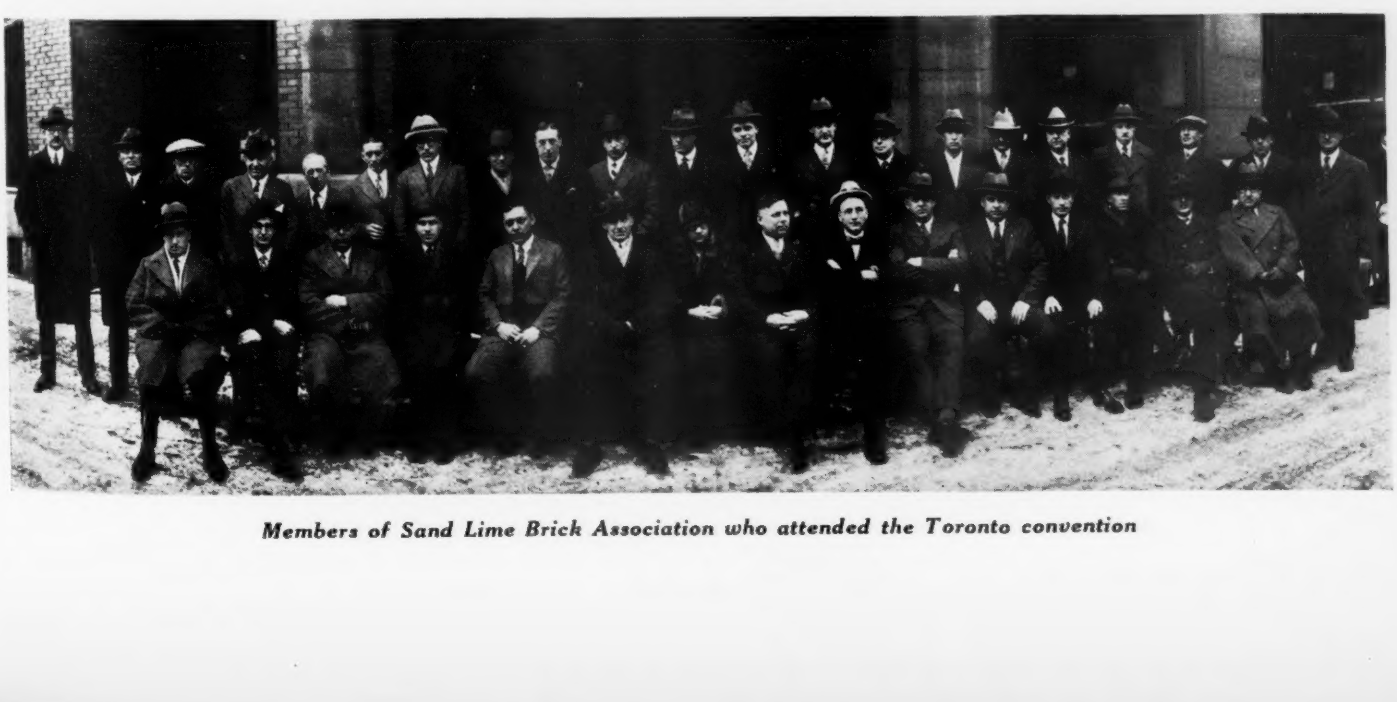
It is not an unusual thing to find crushers that have been used in plants that have been burned. There is a crusher in a plant at Rockwood, Ala., that has passed through two fires and is still doing good work.

Union Rock Company's New Storage Plants

THE Union Rock Co. of Los Angeles, Calif., has just completed its distributing plant at Santa Fe Springs, at a cost of $75,000. This has a capacity of 4000 tons storage and the handling capacity is 300 tons per hour.

With the completion of this plant the company now has 17 distributing stations and plants. It has a ground storage capacity of 500,000 tons, which makes it practically independent of fluctuations in the car supply.

The company has built up its business on the basis of large tonnage production that could be sold on a narrow margin of profit. George Rogers, the president of the company, said in a recent newspaper interview that a difference of ten cents a ton is the difference between success and failure in the rock business in southern California.



Members of Sand Lime Brick Association who attended the Toronto convention

New Plant of the Benton Lime and Stone Company at Limestone, O.

THE pictures on this page show the plant of the recently organized Benton Lime and Stone Co., at Limestone, Ohio. The erection of the kiln plant is complete and it is now in commission producing raw ground lime for glass house and for agricultural use.

The design of the plant is such that additional kilns may be installed without making any additions to the buildings or installing new machinery. There is no hydrating plant at present but it is intended to build one as soon as the number of kilns has been increased.

An Orton and Steinbrenner crane takes the stone from the quarry cars and places it in the kilns. The same crane handles the spalls from the quarry. Fuel for the kilns is also handled by the crane, which places it in a hopper from which it flows on to the firing floor.

The main office of the company has been moved to the plant and a new office building has been erected. Formerly the main office was at Oak Harbor.

The plant is on the W. & L. W. R. R., and has ample track facilities. It is reasonably near the Toledo terminal and hence has a wide range of territory into which to ship its products.

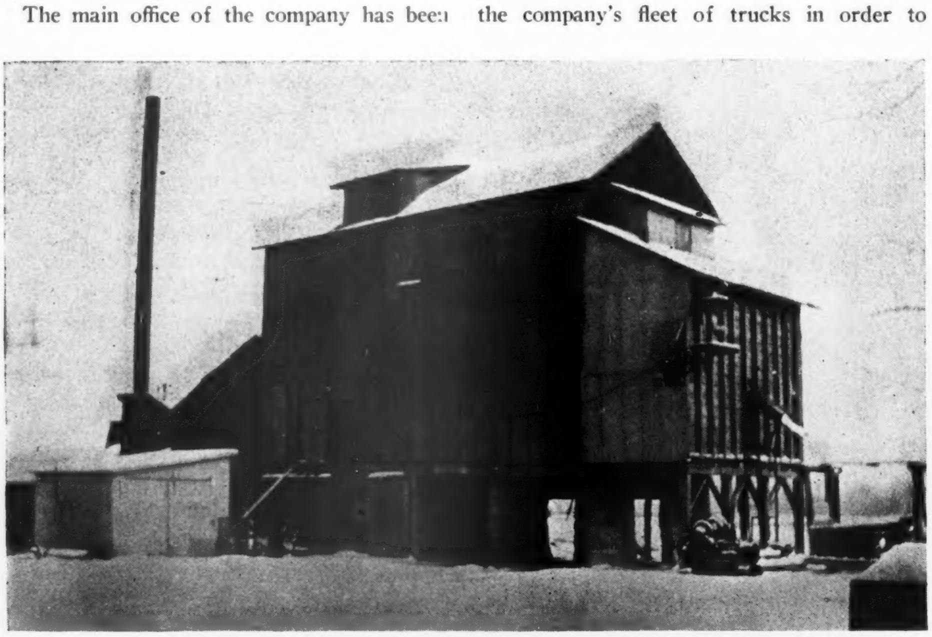
In the near future stone will be shipped from the plant by rail. Hitherto this has not been possible and all the stone has been delivered locally by truck. The company says that there has been a fair demand for stone with prospects of a heavy business at the opening of the season. A large stock of road material has been accumulated in anticipation of this business.

Operations at the crushing plant can be conducted more economically now that a new power unit has displaced the steam power plant. Additions have been made to the company's fleet of trucks in order to give quicker service to road builders.

New office building

Stone for crushing is produced at the quarry by hand work on a tonnage basis. It is taken to the crusher on an incline and raised by a hoist situated in the crusher building.

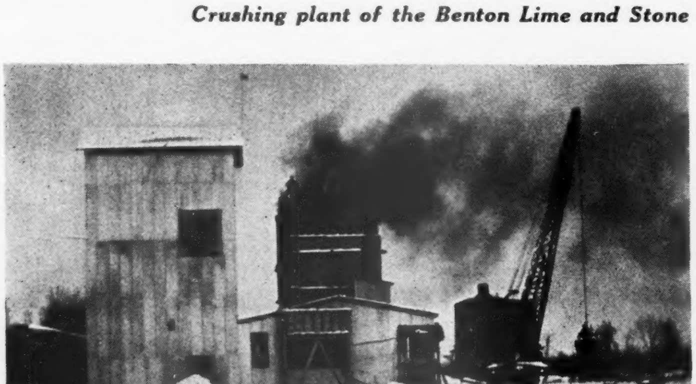
Beside lime and crushed stone, the company produces concrete blocks and this promises to grow into an important branch of the business. With the ever increasing demand for building material in Toledo and Detroit, the concrete products should find a ready market.

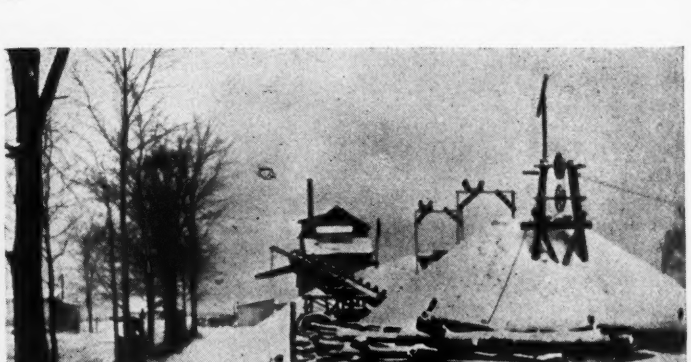


Crushing plant of the Benton Lime and Stone Co.

Curing Concrete

"HOW to Cure Concrete," is the title of a handsome little book issued by the Dow Chemical Co., Midland, Mich. It treats mainly of the curing of concrete highways and shows that the use of calcium chloride (which it manufactures under the trade name of Dowflake) is much cheaper than the ordinary method of pumping water to sprinkle, or of covering with wet earth. It is surprising to learn that in some cases it has taken 300,000 gallons of water to cure a mile of concrete road, all of which had to be pumped at a considerable cost for fuel and labor. The latter part of the book contains some excellent diagrams showing how the modulus of rupture of concrete is increased at various periods of curing by treating with calcium chloride. Instances are given in which patches in concrete roads so treated have been opened for traffic after 48 hours of curing."





Left—Stone is lifted to the top of the kilns by a crane. Right—Crushed stone storage near crushing plant

Tomkins Cove Stone Company to Develop Hudson River Trap Rock Property

THE editor of ROCK PRODUCTS in New York City has been officially informed that the Tomkins Cove Stone Co., Tomkins Cove, N. Y., will proceed immediately with the development of an extensive trap rock property on the shore of the Hudson river, just south of Haverstraw, N. Y. This property was recently acquired by the company and is, so far as known, the only deposit of trap rock accessible to the Hudson river in the New York territory not included in the Palisades Park.

Readers of ROCK PRODUCTS may recall that no trap rock quarry on the Hudson river has been operated since the closing down of the Rockland Lake plant of the New York Trap Rock Co., about four years ago. This quarry was acquired by the Palisades Park Commission under condemnation proceedings. Since then all the trap rock in the New York market has come from the quarry of the New Haven Trap Rock Co., North Branford, Conn.

The Haverstraw property has 1600 ft. of frontage on an arm of the Hudson river and a quarry operation and crushing plant to have an initial capacity of 2500 cu. yd. per day, will be begun as soon as plans are completed. It is expected to have the plant in operation by the spring of 1926.

Sterling Tomkins, president of the Tomkins Cove Stone Co., will have general supervision of design and construction. S. C. Hulse is the engineer in charge. The office of the company as at Tomkins Cove, N. Y.

Operations Resumed at Quarries of Pittsburgh Limestone Company

AFTER being idle for two years, the quarries of the Pittsburgh Limestone Co., on Clover Creek and other locations in the eastern part of Blair county, Penn., resumed operations recently, according to the *Pittsburgh (Penn.) Gazette-Times*. The company is said to be a subsidiary of the United States Steel Corporation.

During the idle period the Clover Creek quarries have been electrified, and all drills, crushers and other mechanical equipment started with electric power, replacing steam. The output goes to the iron and steel industries in the Pittsburgh district, from 20 to 30 carloads of flux stone being shipped daily.

Prospecting Limestone Rock at Stoutsville, Missouri

ENGINEERS from the state highway department and from the contracting firm of Carmichaiel and Cryder of St. Louis, Mo., have been doing considerable prospecting in the vicinity of Stoutsville, Mo., with the view of locating rock quarries there. Approximately $2000 have been spent on tests and drill holes have been sunk over 70 ft. to determine the quality and quantity of the rock. The results of the tests, according to local papers, are favorable.

The state hopes to quarry the rock for use in its road construction and repairing, and the Carmichaiel and Cryder Co., is in quest of rock for railroad ballast contracts.

Frederick W. Upham

FREDERICK W. UPHAM, president and chairman of the board of directors of the Consumers Co. of Chicago, died at Palm Beach, Fla., of a cerebral hemorrhage, February 15. Mr. Upham was one of the best known men in Chicago as he was the acknowledged head of the Republican party in Illinois and had been treasurer of the National Republican organization. He was buried from his residence in Chicago on February 20.

The Consumers Co. is not only the largest dealer in building materials in Chicago, but one of the largest producers, with quarries and sand and gravel operations in Illinois and Indiana. Much of its success was due to the direction of Mr. Upham.

City Sells Rock Crusher

ACCORDING to the *Bristol (Va.) Tennessee-Courier*, a large rock crusher owned by the city of Bristol, Va., has been sold to the firm of Brown and Coffee for about $10,000. The rock crusher has been idle for 2 years but the new owners are moving the crusher and the 4 rock bins and the conveyor, included in the equipment, to a new location and expect to have the plant in operation by March 1.

Another Cement Plant for Ohio

THE Diamond Alkali Co., Cleveland, Ohio, will build at once a 2500-bbl. wet-process portland cement plant at Fairport, Ohio. The engineers are the Fuller-Lehigh Co., Fullerton, Penn.

New Quarry Company to Operate Near St. Louis

THE Grant Road Quarry Company, 819 Buder Building, St. Louis, Mo., has been formed to operate a quarry near Glendale, 11 miles from St. Louis. The quarry was formerly operated as the Glendale quarry bv another company.

The ground has been well developed and there is a face of limestone 35 ft. high which opens up over 27 acres of ground. Some 2½ acres of this has already been stripped as a preliminary to working. The company is already producing building stone and will produce concrete aggregate and eventually railroad ballast from the new plant which it is beginning to erect.

The new plant will have a No. 5 Austin crusher and a No. 3 Gates crusher, which was in use at the old plant on the property, a 48-in. x 20-ft. screen and a No. 6 elevator. All the machinery has been purchased. Electric motors are to drive all the machines including a new air compressor, which will furnish air to the drills.

Jackhammer drills and hand loading will be used at first but it is expected that well drills and steam shovel loading will be substituted for these in a year or two.

Frank C. Stolle is president of the new company, Joseph L. Hemp is vice-president and George E. Lawler is secretary and treasurer. Frank A. Moore is attorney. Mr. Stolle is a quarry man with many years of experience in management and operation. He has other quarry interests near St. Louis.

Determining Elasticity of Stone

THE following article appeared in the *Technical News Bulletin No. 94*, issued by the Bureau of Standards, Washington, D. C.:

"Very few elasticity measurements on natural stone have been made in the past. This is probably due to the difficulty of adapting the usual types of compressometers to the sizes and shapes of stone specimens which are commonly employed for the simpler tests. A compressometer has been designed at the Bureau of Standards which can readily be adapted to a considerable range of sizes and heights of specimens. By means of this instrument the operator can easily make the elastic deformation readings during a compression test. The compressometer is of the averaging type, i. e., it reads by means of a single magnifying dial the average deformation on two opposite sides of the specimen. This apparatus can be adjusted to record the compression deformations between points on the vertical axis of the specimen from 2 in. apart up to 12 in. apart. Stone specimens which are prepared in this laboratory especially for elasticity tests are of the dimensions of 3.5x3.5x12 in. and the deformations are read between points 10 in. apart.

Modulus of elasticity determinations are of particular interest in modern construction, where different types of materials are used in combination. Materials having a high modulus of elasticity deform less under a given load than those having a lower modulus. Hence, in a wall or a column which is composed of two or more different materials the material having the highest modulus of elasticity will have to support more than its share of the superimposed load. The modulus of elasticity of stone usually varies from 2,000,000 to 10,000,000. These values indicate that if a column 20 ft. high is built of stone with the lower modulus and is loaded to 1000 lb. per sq. in. of section, its length will shorten by ⅛ in., while a column of the stone of the high modulus under the same conditions would shorten only 1/40 of an inch."

Iowa Is Facing Exhaustion of Gravel Deposits

IOWA'S available gravel supply is heading toward exhaustion, according to an article in the Iowa State Highway Commission Bulletin.

"This is the settled conviction of the highway commission," says the service bulletin. "This knowledge has been derived during the past eight or 10 years from a constant and aggressive statewide search and investigation conducted by the materials and test department of the commission to locate every economically available deposit of Iowa gravel suitable for surfacing.

"Exhausting Iowa's readily available supply in temporary improvement on heavy traffic roads is an economic waste for which the state will pay heavily in the not distant future.

"By far the most of Iowa's gravel has its origin in the Wisconsin drift area, which is a comparatively small area in the north central part of the state. There are two types of gravel deposits originating in the Wisconsin drift. In the interior of the area have been many knobs and hills containing road gravel. These are the deposits from which most of our gravel roads have been built. These supplies are limited and have been entirely used up in many localities. When the Wisconsin glacier melted, the large streams flowing away carried large quantities of gravel and it is in the ancient banks of these streams that we have our future supply."

Commenting on this, W. D. Maxwell, former county engineer, told the *Sac City Sun* that Sac county is particularly fortunate in its gravel supply. However, there is practically no gravel found west of the watershed which runs north and south through the center of the county and which formed the terminal moraine of the great Wisconsin glacier.

In the eastern half of Sac county, the hill-top gravel deposits are almost all used up, Mr. Maxwell said. "We will have to depend in the future largely on the gravel deposits along the Coon river. These are extensive, but inaccessible. The cost of transporting the gravel from the river banks to roads around Schaller and Odebolt, for instance, will become steadily higher as the gravel supply diminishes."

Sand for Use on Icy Streets

THE use of sand on streets that are covered with snow and ice is increasing in this country and in some places the spreading of the sand is regularly done by the street department of a city. The use of sand has two purposes, it keeps people and horses from slipping and cars from skidding and it actually removes the ice when the sun shines. The sand grains absorb the heat of the sun and transfer it to the snow and ice beneath. Sand is much cleaner than ashes for the purpose, as it does not "track in" to houses nor make dust after it dries and the wind blows.

The best sand to use on streets is washed sand of fairly coarse grain. Such sand is free from mud and it has a much greater effect in melting snow and ice than fine sand has. Unfortunately many producers do not care to make such a sand, as it would take out too much of the coarser sand from that used for concrete and leave a fine sand for which there is not so good a market. But wherever producers can make such a sand profitably they ought to encourage its use for snow and ice removal.

Ask Lower Rates on "Chats"

"CHATS" are the waste from the zinc mills of the Joplin district (largely flint) and they have been used to some extent as fine aggregate in concrete. Recently an especial effort has been made by the towns of Webb City and Cartersville, in the zinc producing district, to have lower freight rates placed on chats so that the business may be increased. The matter is of especial importance to the sand and gravel and crushed stone producers of western Missouri, eastern Kansas and northern Oklahoma, the territory into which the chats would be shipped. Some millions of tons are said to be available for shipping. They are piled up in "young mountains" near the zinc mills. The size of chats is from ⅞-in. down and an industry of crushing chats to ¼-in. down to make concrete sand has sprung up in the zinc district quite recently.

Amarillo, Texas, Sand Plant Makes Improvements

THE Toscosa Sand and Gravel Co. of Amarillo, Texas, has installed a crusher and made other improvements. This plant is run by Mrs. W. M. Adams, whose husband has a men's furnishing store in Amarillo. She succeeded her husband as manager of the plant and has made a success of the business.

Who Pays Demurrage on Account of Frozen Sand?

AT Larned, Kansas, seven cars of sand were shipped to Pawnee county to be used on highways. A heavy snow storm arrived about the same time the sand did and the sand was frozen so solidly that it could not be unloaded for 30 days. The railroad has put in a claim for $5 a day per car for demurrage and the county intends to contest it on the ground that the freezing of the sand was due to an "act of God" and hence the county should not be held liable for the delay.

Take Gravel Freight Rate Case to Court

APPEAL to the district court from the findings of the state railroad and warehouse commission in regard to the rates charged the Summit Sand and Gravel Co. for shipping sand and gravel from Biwabik, Minn., over the Duluth & Iron Range R. R., was filed recently by attorneys for the gravel company.

Findings of the warehouse commission in favor of the railroad were made January 22, following a hearing in October, 1924, on complaint made by the gravel company. The findings, it charges, are not supported by the evidence adduced at the trial and are contrary to law. The complaint of the gravel company is that it is being charged 3 cents a mile to carry its product from the pit, 2.47 miles from Biwabik, to Virginia, Eveleth and Fayal, while its competitor, the Biwabik Concrete Aggregate Co., 2.80 miles from Biwabik, pays only 2 cents a mile.

The railroad commission found that the rate was fair, since the Biwabik Concrete Co. is situated within the railroad's switching limits, while the gravel company is not. —*Duluth (Minn.) Herald.*

Importance of Good Concrete Aggregate Shown by British Engineer

SPEAKING before a British engineering society, F. E. Devry, of the College of Technology, said in the course of an address that he has often been surprised by the great risks taken in the selection of materials for reinforced concrete work, in which the cement had been very carefully chosen to come up to standard, but the choice of aggregate left a great deal to be desired.

"Aggregates used in reinforced concrete work very often fail to reach a satisfactory standard, and the result is a poor concrete, for it is not possible to get good concrete unless the aggregate is satisfactory.

"The popular notion that sharp sand is necessary for good work has long been exploded, and the result of many tests carried out at the College of Technology does show that so long as the sand is clean the sharpness does not matter; what is desirable is that the sand should consist of large grains.

"The tests mentioned were carried out specially to determine the effect of sand particles on the resulting mix, and to obtain this information the sand was crushed to varying degrees of fineness, and used in a number of mixes having exactly similar proportions and sizes of other materials.

"The results show that the strength of the resulting concrete decreases as the size of the sand particles, the reason being, of course, that the surface of sand available for purposes of cohesion governs the ultimate strength of the concrete."

Greenville Gravel Company Elects Officers

AT a recent meeting of the directors of the Greenville Gravel Co., Greenville, Ohio, Fred Coppock was again elected president but was allowed to drop the arduous duties of general manager, and Clarence Patty was elected to hold that position along with that of vice-president, which office he has held for the last 16 years, according to a report in Cincinnati papers.

This company started many years ago in a small way and has expanded until now it is probably the largest producer of washed, screened and crushed gravel in the United States. In 1924 the output of the company was over 4,500,000 tons of sand and gravel.

The company has 12 plants located in three states. Six of these plants are in Ohio, 2 at Fort Jefferson and one each at Urbana, Germantown, Mechanicsburg and Massillon. Three plants are located in Indiana, two being at Richmond and the other at Logansport. The remaining three plants are in Michigan, two located at Kalamazoo and one at Brighton, a suburb of Detroit.

In addition to the production of sand and gravel, this company is allied to the ownership and operation of the Greenville Machine Co., which manufactures Omort gravel trucks and repairs heavy duty machinery, the Allied Belting Co., and the Permanent Post Co. All three of these concerns enjoy a healthy growing business.

New Sand and Gravel Plant in Iowa

THE Iowa Sand and Gravel Co., is going out of existence and the Iowa Sand and Gravel Corporation, capital $100,000, will be formed around the present Cedar River Sand and Material Co., Waterloo, Iowa. This new corporation will develop new holdings near Eddyville, according to the *Albia (Iowa) Union*.

The new plant at Eddyville will be equipped to move material either from the river or inland pits and will be connected with railroad transportation. The firm expects to expend about $60,000 for the development.

New Gravel Firm in San Antonio to Begin Operations

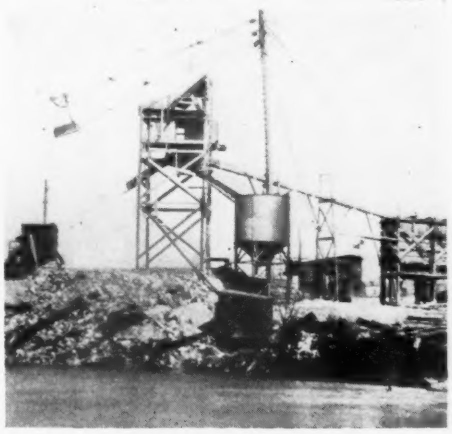
A NEW gravel company has been formed in San Antonio, Texas, known as the Salado Gravel Co. This firm has taken a franchise covering a 74-acre plot about three miles from the city limits on the Austin road and operation will be started in the near future.

The deposit is considered one of the best around San Antonio, and it is believed that it will rival in quality and quantity almost any other pit in the locality. It has been estimated that more than a million and a half yards of marketable gravel are contained in this deposit.

The officers and stockholders of this new company are: P. M. Chuoke, president; A. E. Heilbron, vice-president; Charles A. Wagner, secretary-treasurer. Others are: D. F. Cheatham, A. Salisbury, J. B. Mohle, J. Loustaunau, and E. G. Ensign.

Indiana Gravel Company Enlarges Plant

IN preparation for a heavy demand for sand and gravel for building purposes and street and road construction during the spring and summer months, the Indiana Gravel Co., Indianapolis, Ind., has completed improvements, increasing the production capacity and enlarging storage facilities. Jesse A. Shearer, president of the company, is also secretary-treasurer of the Indiana Sand and Gravel Producers Association.



Plant of Indiana Gravel Co. showing new steel storage tank

Additions to the two plans of this company will increase the capacity for producing sand and gravel by about 200 yd. a day. This will make a total daily output of nearly 1000 yd. of four grades of gravel and sand. In erecting a large steel bin with a capacity of 125 tons of fine sand, the storage facilities of the plants will be increased to 1400 tons. Other improvements made include the new sand separating tank, with a capacity of 500 tons a day, and a new water pump capable of pumping 750 gallons of water a minute on an 85-ft. head.

A Correction

ACCORDING to a statement in the *Tell City (Ind.) News*, an article in that paper saying that the Evansville Sand and Gravel Co. had become the Koch Sand and Gravel Co., quoted in the January 24 issue of ROCK PRODUCTS, was erroneous. The Evansville Sand and Gravel Co. did, however, dispose of its unloading plants but retains its corporate name and is still taking orders on the river anywhere.

A Sister Ship to the "Sandcraft"

A SISTER ship to the *Sandcraft*, the largest of sand dredges, which was described in ROCK PRODUCTS for February 7, has been purchased by the Construction Materials Co., of Chicago, the owners of the *Sandcraft*.

The new boat is at present called the *Lake Wier*, but after it has been refitted and rebuilt to a hopper dredge to do the same work that the *Sandcraft* is doing, it will be given a new name. The dimensions are the same as the *Sandcraft*, and likewise was built in Chicago and after having been used in foreign service has returned to the lakes.

The new ship will have the distinction of being the first on the lakes to be equipped with Diesel electric power. Diesel engines will be used to generate electricity and individual motors will be used to drive the twin screws and the pumps with which it will be fitted. This is the type of power unit that has been adopted by many of the newer boats built in Europe and the United States and it has given very satisfactory results both in fuel economy and ease of operation.

At present the new boat is in Cleveland, where it is being rebuilt and fitted with new machinery.

Sand and Gravel Man to Build New York's New Subway

FROM newsboy to subway builder is the story of the career of Samuel R. Rosoff, who has received a $4,617,000 contract for the construction of section 3-A of Route 78 of the new Washington Heights subway in New York. Thirty years ago Rosoff was selling newspapers in Park Row. A man of powerful physique, tireless energy and a faculty for making friends, Rosoff made his way into the contracting field and has done considerable work for the state. This is his first subway contract.

Rosoff is president of the Rosoff Sand and Gravel Corporation, with a plant at Marlborough-on-the-Hudson. He is constructing a large traprock plant at Jones Point, N. Y., according to New York papers.

New Gravel Plant to Be Built at La Grange, Missouri

THE Moline Consumers' Co., of Moline, Ill., according to the *La Grange (Mo.) Indicator*, has leased land for 3½ miles along the river south of La Grange, Mo., and will build a gravel plant there.

The plant will be equipped to wash and grade the gravel and will have a capacity of 20 cars a day. It will be equipped with a 100-hp. engine and two cranes, one for unloading barges and the other for loading the washed gravel into cars. Four concrete bins will be constructed for the different grades of gravel. The plant is expected to begin operating in the first part of April.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning February 3:

Illinois Freight Association Docket

2220-D. Cement. Minimum weight 50,000 lb., from all producing points in I. R. C. territory to Nason, Ill. Present, class or combination; proposed, commodity rates based on mileage scale prescribed by order of the I. C. C. in Docket 12710, plus 1 cent per 100 lb.

2976. Gannister or gravel (novaculite). Minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity of car, actual weight will apply, but not less than 40,000 lb., from Olibe Branch, Ill., to Wayne City, Ill. Present, $1.13; proposed, $1.26 per net ton.

2977. Limestone, ground. Minimum weight marked capacity of car, but not less than 80,000 lb., from Mosher and Ste. Genevieve, Mo., to mining towns such as Belleville, Herrin, Johnston City, Marion, Ill., etc. Present, combination of locals; proposed, $1.50 per net ton.

2991. Crushed stone, sand and gravel. Minimum weight 90% of marked capacity of car, from Joliet district to Rinard, Cisne, Geff and Fairfield, Ill. Present, $3 per net ton; proposed, $1.26 per net ton.

3002. Crushed stone. Minimum weight 90% of marked capacity of car, except when loaded to full capacity, actual weight will govern, to Hannibal, Mo., from McManus and Tucket Siding and Montrose, Iowa. Present, 9½ cents; proposed, 90 cents per net ton. From Keokuk, Iowa, present, 8½ cents; proposed, 80 cents per net ton.

1376. Sand and gravel. Carloads, minimum weight marked capacity of car. Rates in cents per net ton: From Cairo, Metropolis and Brookport, Ill., to Mount Vernon, Ill., present, 113; proposed, 105.

3013. Gravel, novaculite or gannister. Carloads, minimum weight 60,000 lb. Rates in cents per net ton: From Wolf Lake, Ill., to Murphysboro, Ill., present, 101; proposed, 63.

3015. Sand and gravel. Carloads, minimum weight marked capacity of car, from Grayville, Ill., to B. & O. R. R. stations, viz.: Present, combination rates; proposed, Rinard, Ill., $1.26; Cisne, Ill., $1.26; Geff, Ill., $1.26; Fairfield, Ill., $1.26.

3017. Cement. Carloads, from Buffington, Ind., group to C. M. & St. P. stations, e. g.:

	Present. Cents	Proposed Cents
Chicago	8.5	7
Healy	8.5	7.5
Grayland	8.5	7.5
Melody	8.5	8
Rondout	8.5	8
Chicago Heights	....	7

3019. Sand and gravel. Carloads minimum weight when loaded full visible capacity, except when loaded full visible capacity, actual weight will apply.

From Quincy Ill.

To—	Present	Proposed
Bardolph	$1.01	$ .88
Bushnell	1.01	.88
Prairie City	1.01	.88
Avon	1.01	.88

3024. Crushed stone, sand and gravel. Carloads minimum weight marked capacity.

From McCook and Gary

To—	Present	Proposed
Freeport	$1.51	$1.13
Dixon	1.52	1.26
Mendota	1.26	1.26
Dubuque	2.52	1.52

From Hillside

To—	Present	Proposed
Freeport	$1.01	$1.00
Dixon	1.26	1.13
Mendota	1.26	1.13

From Coleman

To—	Present	Proposed
Dixon	$1.13	$1.00
Mendota	1.13	1.00

To stations on I. C.

Trunk Line Association Docket

12418. To cancel the rate of $3.28 per net ton on sand from Baltimore, Md., to Babbitt, Seaboard and Newark, N. J., account rates being obsolete. Classification basis to apply. File 29496.

Central Freight Association Docket

10017. Sand (except blast, engine, foundry, glass, molding or silica sand) and gravel. Cayuga and Silverwood, Ind., to Stockland, Ill. Present, 13½ cents; proposed, 94 cents per net ton.

10039. Crushed stone. Melvin, Ohio, to Epworth Heights, Branch Hill, Miamiville, Camp Dennison, Milford, Terrace Park, Tower Hill, Indian Hill, Plainville, Clare, Red Bank, Rendcomb Junction, Linwood, Carrell Street, Torrence Road, Cincinnati, Ohio. Present, 13½ cents; proposed, 80 cents per net ton.

10053. Sand blast, engine, foundry, core, glass and silica. Berlin Heights, Shinrock and Avery, Ohio, to Detroit, Mich. Present, $1.76 per net ton; proposed, $1.30 per net ton.

10092. Refuse foundry sand. Alliance, Ohio, to Maximo, Ohio. Present, 88 cents per net ton; proposed, 3½ cents, minimum weight 50,000 lb.

10093. Sand. Ottawa to Blairsville, Penn. Present, $3.93 per net ton; proposed, $3.43 per net ton, to be held as maxima at intermediate points.

Southern Freight Association Docket

18415. Crushed stone. Carloads, from Madisonville, Ky., to stations located on the Evansville & Ohio Valley Ry., E. I. & T. H. Ry., C. C. C. & St. L. Ry., C. & E. I. R. R. and I. C. R. R. No through rates in effect. It is proposed to establish rates applicable via the I. C. R. R., in line with present rates from Cedar Bluff, Ky., via the I. C. R. R. Statement of proposed rates will be furnished interested parties upon request.

18432. Cement. Carloads, from Birmingham, Ala., and group and Leeds, Ala., to Camilla and Pelham, Ga. From Birmingham to Camilla, combination now applies; proposed, 20 cents per 100 lb., same as rate to Pelham, Ga. Present rate from Leeds to Camilla, 20½ cents; proposed, 20 cents, same as proposed to Pelham, Ga. From Leeds to Pelham, combination applies; proposed, 20 cents per 100 lb., same as rate from Birmingham, Ala.

18460. Crushed stone, etc. It is proposed to establish the following rates on stone, crushed or rubble, stone screenings, slag, chert, sand or gravel (washed or unwashed), carloads, from Bolingbroke, Ga., which represent reductions: To Ellaville, Fla., $1.76; Vienna, Ga., $1.16; Ashburn, Ga., $1.30; Tifton, Ga., $1.40; Sparks, Ga., $1.49; Valdosta, Ga., $1.56; Crawford, Fla., $1.76; Jasper and Lake City, Fla., $1.60; Palatka, Fla., $1.80 per net ton; made in line with proposed rates from Holton, Ga.

18471. Crushed stone. Carloads, from Samlaw, S. C., to Charleston, S. C., and Savannah, Ga. Present rate to Charleston, $1.50; proposed, $1.35. To Savannah, present rate, $1.93; proposed, $1.48 per net ton.

18492. Slag. Carloads, from Alabama City and Gadsden, Ala., to Chattanooga, Tenn., and group. Present rate, $1.02 per net ton; proposed, 80 cents per net ton, same as present rate on sand from and to points mentioned.

18520. Sand and gravel. It is proposed to amend Commodity Descriptions Nos. 95, 96 and 98 of Agent Glenn's Montgomery-Selma Tariff, I. C. C. A419, to provide that these descriptions (applicable on sand and gravel, carloads) will apply in either straight or mixed carloads. This, in order to clarify the application of the tariff.

18527. Sand and gravel. Carloads, from Sewanee and Estill Springs, Tenn., to Chattanooga, Tenn. Present rate, 95 cents; proposed, 90 cents per net ton, same as rate in effect from Saulsbury and LaGrange, Tenn.

18543. Minimum carload weight on cement, lime and wall plaster, mixed carloads, and cement, in straight carloads, from Kosmosdale, Ky., to Louisville, Ky., for beyond. Present minima: Cement, in straight carloads, 30,000 lb.; cement, lime and plaster, in mixed carloads, 40,000 lb. Proposed minima: Cement, in straight carloads, carload minimum weight 50,000 lb., except when for carriers' convenience a car of less capacity is furnished, minimum weight will be marked capacity of car, but not less than 40,000 lb.; cement, lime and plaster, in mixed carloads, 50,000 lb. The proposed minima is the same as that generally applicable between points in Southern territory.

18560. Cement. Carloads, from Birmingham, Boyles and North Birmingham, Ala., to Vienna, Ga. Present rate, 17½ cents; proposed, 16 cents per 100 lb., same as present rate to Cordele, Ga.

18592. Cement. Carloads, from Southeastern producing points to Plaquemine, La. It is proposed to reduce present rates to be as follows: From Birmingham, North Birmingham, Leeds, Ragland, Ala., 29½ cents; Chattanooga, Richard City, Tenn., and Rockmart, Ga., 31 cents; Spocari, Ala., 26½ cents; Kingsport, Tenn., 35 cents per 100 lb. Proposed rates are based on New Orelans, La., combination.

18607. Sand and gravel. Carloads, from Montgomery to Sylacauga, Ala. (Applicable only on intrastate traffic.) Present rates: Sand, carloads, $17.50 per car of 30,000 lb. or less, excess in proportion; gravel, 6½ cents per 100 lb.; proposed rate, 79 cents per net ton, made in line with rate in effect to Talladega, Ala.

18640. Cement. It is proposed to revise existing rates on cement, carloads, from Kingsport, Tenn., to points on the Southern Ry. in Tennessee to basis of not lower than the carriers' proposed cement scale.

18661. Sand and gravel. Carloads, between Chattanooga, Tenn., and Rome, Ga., on the N. C. & St. L. Ry., Central of Ga. Ry. and So. Ry. It develops that the present rates between Chattanooga, Tenn., on the one hand and Rome and Dalton, Ga., on the other hand are not the same for account of all initial lines. It is proposed to revise the rates between Rome, Ga., and Chattanooga, Tenn., via all lines to be the same as the Georgia-Alabama proposed scale for the distance via the So. Ry. or C. of Ga. Ry., i. e., 99 cents per net ton. It is proposed to establish between Chattanooga and Dalton rate made on basis of Georgia proposed scale, less 10%, for distance via N. C. & St. L. Ry. or So. Ry., i. e., 77 cents per net ton. At intermediate stations on the N. C. & St. L. Ry., the proposed Rome, Ga., rate to be held as maxima. At intermediate points on the C. of Ga. Ry., the proposed Alabama-Georgia scale is observed as maxima. At intermediate points on So. Ry., the present rates are the same as the Georgia proposed scale, therefore no change is proposed.

Southwestern Freight Bureau Docket

3644. Cement. To establish a minimum weight 50,000 lb. of portland cement, carloads, from Bonner Springs, Kan., to stations on the St. L.-S. F. Ry. in southern Missouri. As the minimum weight on cement generally throughout Southwestern Freight Bureau and Western Trunk Line Committee territory is 50,000 lb., it is felt that this minimum should be published for application from and to the points outlined above.

3662. Cement plaster. To establish a rate of 29½ cents per 100 lb. on cement plaster and articles taking the same rates as specified in Item I of S. W. L. Tariff No. 3E from Acme and Agatite, Texas, on the Ft. Worth & Denver City Ry. to Laurel, Miss. It is stated that the proposed rate is the Vicksburg combination published in connection with Agent Jones' Tariff 228.

3666. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas, to points on the Louisiana & Pacific Ry. It is stated that the present rate from Kansas Gas Belt is 29½ cents, the rate from Ada being 3 cents less. The rate from Harrys and Eagle Ford, Texas, is only 1 cent under the Ada, Okla., rate, the mileage being from Ada 446 miles and from Harrys 325 miles. It is felt that this difference in distance justifies the rate from Harrys and Eagle Ford to the destinations outlined above 3 cents per 100 lb. less than the Ada, Okla., rate.

3669. Cement. To establish the following rates in cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to points shown below:

St. L. S. W. Ry. Co.—	
North Little Rock, Ark. (Index 15205), to Pine Bluff, Ark. (Index 15285) inclusive	20½
Sorrels, Ark. (Index 15290), to Milner, Ark. (Index 15470) inclusive	20½
McNeil, Ark. (Index 15475), to Buckner, Ark. (Index 15495) inclusive	20½
Stamps, Ark. (Index 15500), to Foster, La. (Index 15590) inclusive	20½
Gotham, Ark. (Index 15605), to Genoa, Ark. (Index 15630) inclusive	20½

Collier, Ark. (Index 15636), to Waldstein, Ark.
(Index 15670) inclusive............................ 24

Shippers at Harrys and Eagle Ford, Texas, contend that they are at a disadvantage and are unable to compete with shippers at Cape Girardeau and St. Louis, Mo., and Ada, Okla. Rates from these points are lower regardless of distance than those applicable from Harrys and Eagle Ford, Texas, and it is felt that a more equitable basis of rates should be established.

3671. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas, to stations on the Christie & Eastern Ry. It is stated that the present rate on cement from Kansas Gas Belt points is 29½ cents per 100 lb., the rate from Ada, Okla., being 3 cents per 100 lb. less. The rate from Harrys and Eagle Ford, Texas., is only 1 cent per 100 lb. under the Ada, Okla., rate, the mileage being from Ada 404 miles and from Harrys 284 miles. It is felt that this difference in distance justifies the rate from Harrys and Eagle Ford to these destinations 3 cents per 100 lb. less than the Ada, Okla., rate.

3672. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas, to G. C. & S. F. Ry., Louisiana stations. It is stated that the present rate on cement from Kansas Gas Belt points is 29½ cents per 100 lb. the rate from Ada, Okla., being 3 cents per 100 lb. less. The rate from Harrys and Eagle Ford, Texas, is the same as the Ada, Okla., rate, the mileage being from Ada 446 miles, and from Harrys 307 miles. It is felt that this difference in distance justifies a rate from Harrys and Eagle Ford, Texas, to these destinations 3 cents per 100 lb. less than the Ada, Okla., rate.

3673. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the Neame, Carson & Southern R. R. It is stated that the present rate on cement from Kansas Gas Belt points is 29½ cents per 100 lb., the rate from Ada, Okla., being 3 cents less. The rate from Harrys and Eagle Ford, Texas, is the same as the Ada, Okla., rate the mileage being from Ada 452 miles, and from Harrys 335 miles. It is felt that the difference in distance justifies the rate from Harrys and Eagle Ford, Texas, to these destinations based on 3 cents less than the Ada, Okla., rate.

3675. Cement. To establish a rate of 20½ cents per 100 lb. to De Queen & Eastern Ry. stations, West Line, Rolling Fork and De Queen, Ark., and a rate of 23 cents per 100 lb. to Geneva, Locksburg, Provo, Shrums Springs and Dierks, Ark., on cement, carloads, as described in S.W.L. Tariff No. 90E, from Harrys and Eagle Ford, Texas. Shippers state that the rates from Harrys and Eagle Ford, Texas, are higher than the rates from Ada, Okla., whereas the distance from Harrys, Texas, to De Queen, Ark., is 205 miles, as compared with 208 miles from Ada, Okla. They therefore request the same rates as those in effect from Ada.

3676. Cement. To establish a rate of 20 cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas, to stations on the Tremont & Gulf Ry. Shippers state that the rates to stations on the Tremont & Gulf Ry. from Harrys and Eagle Ford, Texas, are exceedingly out of line, distance considered, when compared with rates from St. Louis and Cape Girardeau, and request the establishment of a rate that will enable them to compete with shippers to St. Louis and Cape Girardeau.

3677. Cement. To establish a rate of 24 cents per 100 lb. to G. N. & A. Ry. stations, Murfreesboro and Maxwell, Ark., and a rate of 20½ cents per 100 lb. to all other stations on that line, on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas. It is stated that a higher rate is applicable from Harrys and Eagle Ford, Texas, to stations on the G. N. & A. Ry. than is applied from the Kansas Gas Belt, Ada, Okla., or Cape Girardeau, Mo., and shippers request the publication of a rate which will eliminate the discrimination now existing.

3678. Cement. To establish a rate of 20½ cents per 100 lb. to Thornton & Alexandria R. R. stations, Thornton, La., and a rate of 24 cents per 100 lb. to all other stations on cement, carloads, as described in S. W. L. Tariff No. 90E, from Harrys and Eagle Ford, Texas. Shippers request the publication of more equitable rates from Harrys and Eagle Ford, Texas, when compared with rates from Ada, Okla., and Cape Girardeau, Mo.

3699. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the Red River & Gulf Ry. It is stated that the present rate from Kansas Gas Belt points is 29½ cents, the rate from Ada, Okla., being 3 cents less. The rate from Harrys and Eagle Ford, Texas, to stations Togo to Bolton, La., inclusive, is 2 cents per 100 lb. under the Ada, Okla., rate and to stations Concrete Hill to Kurthwood, La., inclusive, 1 cent per 100 lb. under the Ada, Okla., rate, the mileage being from Ada 453 miles and from Harrys 326 miles. It is felt therefore that the difference in distance justifies the rate from Harrys and Eagle Ford to these destinations based on 3 cents per 100 lb. less than the Ada, Okla., rate.

3700. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the Gulf & Sabine River R. R. stations. It is stated that the present rate on cement from Kansas Gas Belt points is 29½ cents per 100 lb., the rate from Ada, Okla., being 3 cents per 100 lb. less. The rate from Harrys and Eagle Ford, Texas, is the same as the Ada, Okla., rate, the mileage being from Ada 465 miles and from Harrys 345 miles. It is felt that this difference in distance justifies the rate from Harrys and Eagle Ford, Texas, to these destinations based on 3 cents per 100 lb. less than the Ada, Okla., rate.

3701. Cement. To establish a rate of 23½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the Leesville, Slagle & Eastern Ry. It is stated that the present rate on cement from Kansas Gas Belt points is 29½ cents, the rate from Ada, Okla., being 3 cents per 100 lb. less. The rate from Harrys and Eagle Ford, Texas, is only 1 cent per 100 lb. under the Ada, Okla., rate, the mileage being from Ada 425 miles and from Harrys 308 miles. It is felt that this difference justifies the rate from Harrys and Eagle Ford, Texas, based on 3 cents per 100 lb. less than the Ada, Okla., rate.

3702. Cement. To establish a rate of 20½ cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the St. L.-S. F. Ry., in Arkansas, Powers to Arkinda, Ark., inclusive. Shippers point out that at the present time no rates are in effect to stations on the St. L.-S. F. Ry., outlined above, and call attention to a rate of 20 cents per 100 lb. from Ada and 20½ cents from Cape Girardeau, Mo., and distances considered request the publication of more equitable rates from Harrys and Eagle Ford, Texas.

3703. Cement. To amend S. W. L. Tariff 114A, as outlined below:

1. Correct Note "C" of Item 850S and Note 6 of Item 881 adding thereto the following tariff: Yazoo & Mississippi Valley Railroad Tariff 30B, I. C. C. 5805.

2. Amend Note 5 of Item 865G to read as follows: "Note 5—Will apply only on interstate traffic between Baton Rouge, La., on the Y. & M. V. R. R., on the one hand and points in Louisiana on and west of the Mississippi river on the other, as authorized in paragraph (2), section B, of Item 850S, or reissue, on interstate traffic between points on the U. & M. V. R. R., between Baton Rouge and New Orleans, La., on the one hand and points in Arkansas on the other apply New Orleans, La., rates in section 1 of tariff as amended."

3. Correct Note 3 of Item 15B to read as follows: "Note 3—Will not apply on traffic from or between Louisiana points, except will apply for account A. & V. Ry., M. & N. A. R. R., St. L. S. W. Ry., V. S. & P. Ry. and Y. & M. V. R. R."

The Illinois Central R. R. and Y. & M. V. Ry. call attention to various discrepancies in Items 15B, 880P, 865G and 881 of S. W. L. Tariff 114A, which apparently should be corrected without further delay.

3716. Cement. To establish a rate of 20 cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to stations on the V. S. & P. Ry. in Louisiana. Shippers request the publication of same rates from Harrys and Eagle Ford, Texas, as applicable from Cape Girardeau, Mo.

3717. Cement. To establish the following rates in cents per 100 lb. on cement, carloads, as described in S. W. L. Tariff 90E, from Harrys and Eagle Ford, Texas, to the following stations on the K. C. S. Ry.:

Louisiana—
Caddo Refinery Spur.. 19
Pine Island Ref. Co. Spur................................. 19
Allen Mfg. Co... 19
Western Silo Co... 19
Brown Stave Co. Spur...................................... 19
Caddo Window Glass Co. Spur........................ 19
Shreveport G. & B. Co., Index 3957, to Mansfield, La., Index 4010, inclusive.... 22½
Texas Co. Spur, Index 4018, to Kearney, La., Index 4315, inclusive........................ 22½

Shippers state that as rates from Ada, Okla., are based 3 cents per 100 lb. under rates from points in the Kansas Gas Belt, it is felt that the rates from Harrys and Eagle Ford should be revised to the same basis.

3742. Cement. To establish a rate of 20½ cents per 100 lb. on cement, natural or portland (building cement), carloads, minimum weight 50,000 lb., from Fredonia, Independence, Iola and Kincaid, Kan., to Kennett, Mo. It is the desire of the Mo. Pac. R. R. to meet competition of the St. L.-S. F. Ry. at Kennett, Mo.

3764. Cement. To establish a rate of 52 cents per 100 lb. on cement (asbestos), carloads, minimum weight 40,000 lb., from Kansas City, St. Louis and Chicago territories to Shreveport, Monroe and West Monroe, La. Shippers feel that rates to Shreveport, Monroe and West Monroe, La., should not exceed the rates to the Houston-Galveston group.

Western Trunk Line Docket

1062-B. Sand, molding. Carloads, from Ottumwa, Iowa, to La Grange, Mo. Present, 11 cents per 100 lb.; proposed, $1.44 per ton. Minimum weight, 90% of the marked capacity of car, except when actual weight of the shipment, loaded to full visible capacity of car is less than 90% of the marked capacity, the actual weight will be the minimum, but not less than 40,000 lb.

Washington Cement Rates Examined

HEARING opened before the department of public works at Olympia, Wash., recently, which arraigned importers on the one side and home manufacturers on the other, being the complaint of Jahn & Co., importers of Seattle, against the Northern Pacific Railway Co., challenging the rates on cement between Seattle and Yakima and intermediate points as being excessive.

On the other hand it is contended by the two big cement manufacturing concerns of western Washington that with their longer hauls and higher rates a reduced rate between Seattle and Yakima and intermediate points would be to monopolize all that territory for the importer of cement and practically put the cement plants of this state out of business.—*Tacoma (Wash.) Ledger.*

Building Permits in 1924

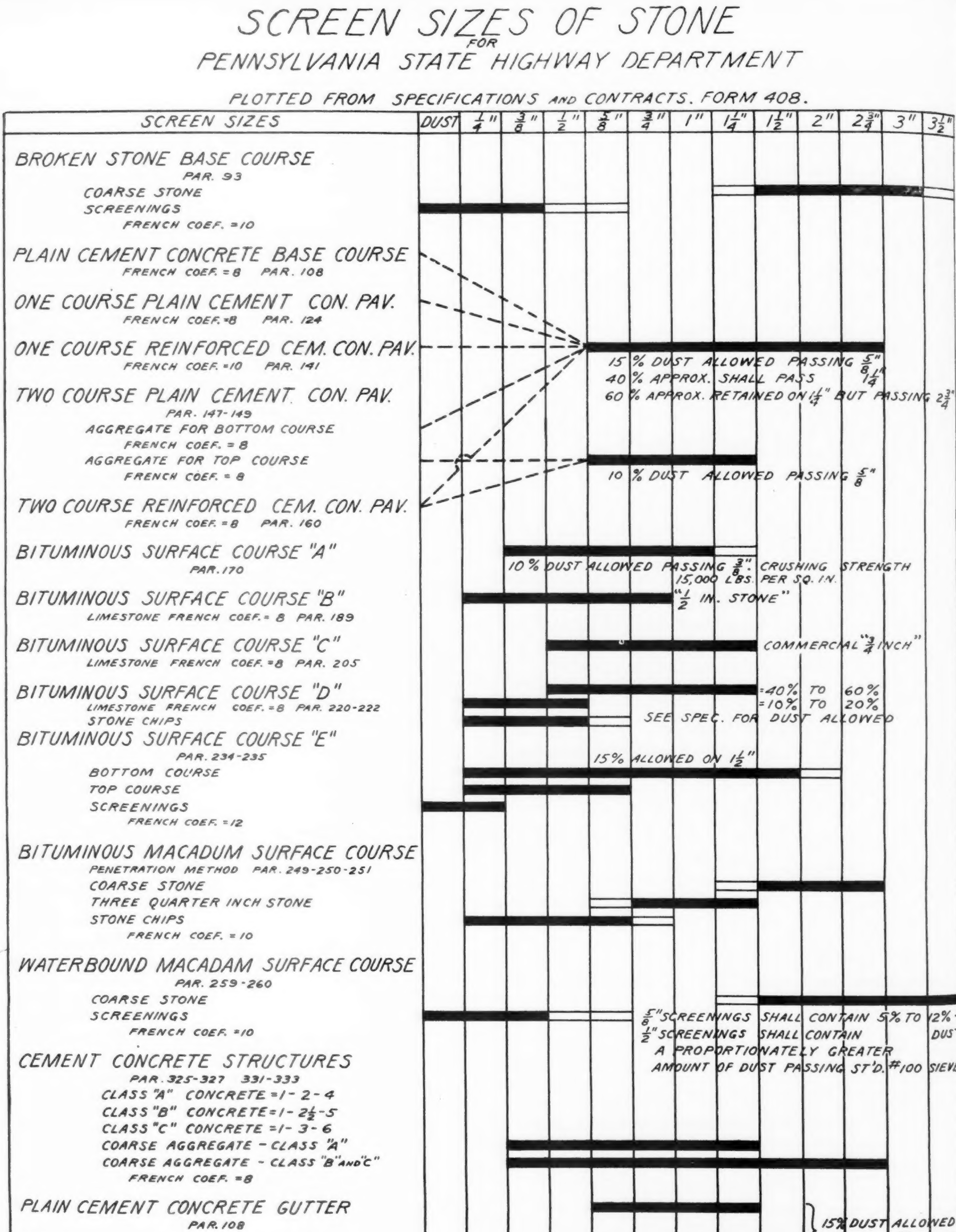
The following lists of building permits issued in 1924, as compared with 1923, have been issued by the Straus service. It will be noted that while 1924 shows an increase over 1923, the increase came almost wholly from three large cities on the Atlantic coast:

	Year, 1924	Year, 1923
1. New York, P.F.	$843,270,328	$791,067,905
2. Chicago	296,893,985	329,604,317
3. Detroit	160,064,825	129,662,711
4. Los Angeles	150,147,516	200,133,181
5. Philadelphia	141,737,460	122,650,935
6. Cleveland	63,014,900	69,390,540
7. San Francisco	57,852,972	46,686,622
8. Boston P.F.	53,031,931	40,626,352
9. Baltimore	45,771,050	37,590,401
10. Washington	45,525,128	49,623,605
11. Milwaukee	45,375,542	39,007,845
12. Newark, N. J.	42,483,876	35,507,219
13. St. Louis	39,831,639	41,443,755
14. Pittsburgh	34,156,550	32,915,312
15. Oakland, Cal.	31,223,485	27,628,897
16. Rochester	29,588,762	21,938,764
17. Portland, Ore.	29,219,425	25,247,135
18. Buffalo	28,582,845	27,907,000
19. Seattle	27,279,500	22,482,678
20. Indianapolis	26,524,575	27,307,279
21. Dallas	26,402,814	20,988,319
22. Denver	26,310,250	20,641,750
23. Providence	25,381,700	21,622,900
24. Cincinnati	24,423,470	27,150,520
25. Memphis	23,757,040	19,545,980
Total	$2,317,851,568	$2,228,371,922

P.F. indicates figures are for plans filed instead of permits issued.

Limestone Containing Manganese Finds Use in India

LIMESTONE containing manganese has been used in cupola furnaces in India in melting cast iron using Indian coke, which contains from 20 to 25% ash for fuel. This flux rendered a suitably liquid slag and the castings produced were of good quality. Limestone containing manganese is thus a good oxidizer.



SCREEN SIZES OF STONE
FOR
PENNSYLVANIA STATE HIGHWAY DEPARTMENT
PLOTTED FROM SPECIFICATIONS AND CONTRACTS. FORM 408.
SCREEN SIZES
DUST
1/4"
3/8"
1/2"
5/8"
3/4"
1"
1 1/4"
1 1/2"
2"
2 3/4"
3"
3 1/2"
BROKEN STONE BASE COURSE
PAR. 93
COARSE STONE
SCREENINGS
FRENCH COEF. = 10
PLAIN CEMENT CONCRETE BASE COURSE
FRENCH COEF. = 8 PAR. 108
ONE COURSE PLAIN CEMENT CON. PAV.
FRENCH COEF. = 8 PAR. 124
ONE COURSE REINFORCED CEM. CON. PAV.
FRENCH COEF. = 10 PAR. 141
15 % DUST ALLOWED PASSING 5/8"
40 % APPROX. SHALL PASS 1 1/4"
60 % APPROX. RETAINED ON 1 1/4" BUT PASSING 2 3/4"
TWO COURSE PLAIN CEMENT CON. PAV.
PAR. 147-149
AGGREGATE FOR BOTTOM COURSE
FRENCH COEF. = 8
AGGREGATE FOR TOP COURSE
FRENCH COEF. = 8
10 % DUST ALLOWED PASSING 5/8"
TWO COURSE REINFORCED CEM. CON. PAV.
FRENCH COEF. = 8 PAR. 160
BITUMINOUS SURFACE COURSE "A"
PAR. 170
10 % DUST ALLOWED PASSING 3/8". CRUSHING STRENGTH 15,000 LBS. PER SQ. IN.
BITUMINOUS SURFACE COURSE "B"
LIMESTONE FRENCH COEF. = 8 PAR. 189
"1/2 IN. STONE"
BITUMINOUS SURFACE COURSE "C"
LIMESTONE FRENCH COEF. = 8 PAR. 205
COMMERCIAL "3/4 INCH"
BITUMINOUS SURFACE COURSE "D"
LIMESTONE FRENCH COEF. = 8 PAR. 220-222
STONE CHIPS
= 40% TO 60%
= 10% TO 20%
SEE SPEC. FOR DUST ALLOWED
BITUMINOUS SURFACE COURSE "E"
PAR. 234-235
15% ALLOWED ON 1 1/2"
BOTTOM COURSE
TOP COURSE
SCREENINGS
FRENCH COEF. = 12
BITUMINOUS MACADUM SURFACE COURSE
PENETRATION METHOD PAR. 249-250-251
COARSE STONE
THREE QUARTER INCH STONE
STONE CHIPS
FRENCH COEF. = 10
WATERBOUND MACADAM SURFACE COURSE
PAR. 259-260
COARSE STONE
SCREENINGS
FRENCH COEF. = 10
5/8" SCREENINGS SHALL CONTAIN 5% TO 12% DUST
1/2" SCREENINGS SHALL CONTAIN A PROPORTIONATELY GREATER AMOUNT OF DUST PASSING ST'D. #100 SIEVE.
CEMENT CONCRETE STRUCTURES
PAR. 325-327 331-333
CLASS "A" CONCRETE = 1-2-4
CLASS "B" CONCRETE = 1-2 1/2-5
CLASS "C" CONCRETE = 1-3-6
COARSE AGGREGATE - CLASS "A"
COARSE AGGREGATE - CLASS "B" AND "C"
FRENCH COEF. = 8
PLAIN CEMENT CONCRETE GUTTER
PAR. 108
15% DUST ALLOWED PASSING 5/8" SCREEN
PLAIN CEMENT CONCRETE CURBING
PAR. 108
FOR PARAGRAPH REFERENCES SEE FORM 408 ISSUED JAN. 1922. REVISED MAR. 1923.
KEY
REQUIRED
TOLERANCE

January Output of Portland Cement

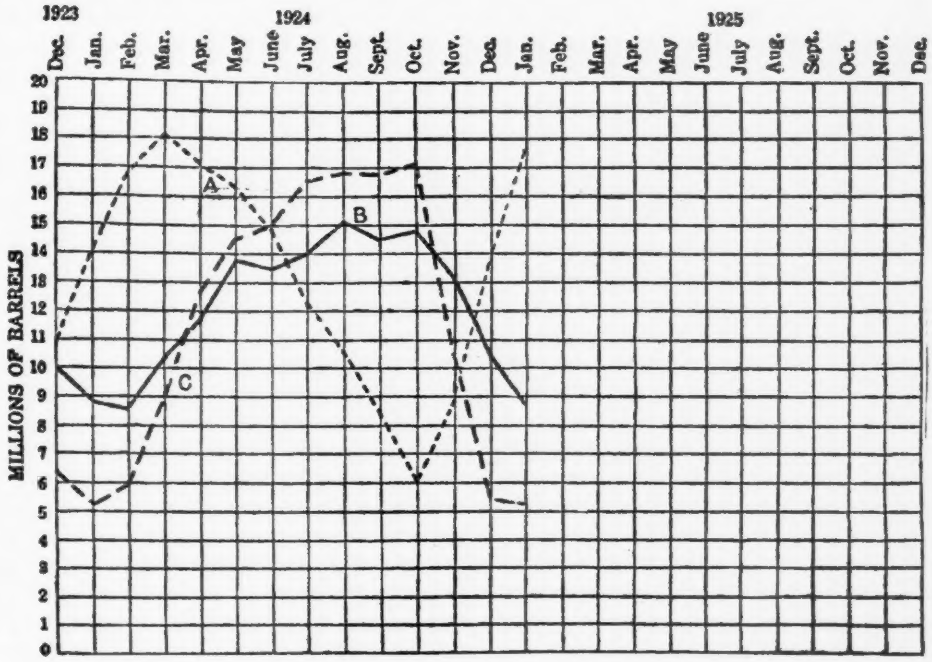
Geological Survey Estimates of Production

THE following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of portland cement. The January, 1925, totals include estimates for five plants. January production exceeds that of all corresponding months; shipments are slightly below those of a year ago but above those of January in all other years; stocks are far in excess of those usually on hand at this period and are exceeded only by those at the end of March, 1924.

Stocks of clinker, or unground cement, at the mills at the end of January, 1925, amounted to about 6,928,000 bbl. compared with 5,433,000 bbl. (revised) at the beginning of the month.

Imports and Exports

The Bureau of Foreign and Domestic Commerce, of the department of Commerce, reports that the imports of hydraulic cement in December, 1924, amounted to 173,814 bbl., valued at $285,481. The total imports in 1924 amounted to 2,010,936 bbl., valued at $3,116,564.



(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JANUARY, 1924 AND 1925, AND STOCKS IN DECEMBER, 1924, IN BARRELS

Commercial district	Production—January, 1924	Production—January, 1925	Shipments—January, 1924	Shipments—January, 1925	Stocks at end of January, 1924	Stocks at end of January, 1925	Stocks at end of December, 1924*
E'n Penn., N. J. & Md.	2,382,000	2,267,000	1,384,000	1,006,000	2,830,000	3,749,000	2,488,000
New York	459,000	533,000	189,000	148,000	923,000	1,168,000	738,000
Ohio, W'n Penn. & W. Va.	779,000	808,000	360,000	338,000	1,481,000	1,840,000	1,370,000
Michigan	299,000	208,000	196,000	188,000	814,000	986,000	966,000
Wis.,† Ill., Ind. & Ky.	1,346,000	1,572,000	635,000	705,000	2,257,000	2,907,000	2,040,000
Va., Tenn., Ala. & Ga.	696,000	967,000	523,000	706,000	631,000	730,000	469,000
E'n Mo., Ia., Minn. & S.D.‡	960,000	711,000					
W'n Mo., Neb., Kan., &			296,000	332,000	2,518,000	3,117,000	2,737,000
Okla.	394,000	315,000	278,000	220,000	1,260,000	1,577,000	1,482,000
Texas	314,000	304,000	287,000	280,000	305,000	379,000	356,000
Colo. & Utah	61,000	80,000	70,000	55,000	261,000	341,000	316,000
Calif.	922,000	1,075,000	898,000	987,000	373,000	558,000	470,000
Ore., Wash. & Mont.	176,000	76,000	94,000	143,000	502,000	368,000	436,000
	8,788,000	8,916,000	5,210,000	5,108,000	14,155,000	17,720,000	13,913,000

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924, and shipping January, 1925.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS

Month	Production 1924	Production 1925	Shipments 1924	Shipments 1925	Stocks at end of month 1924	Stocks at end of month 1925
January	8,788,000	8,916,000	5,210,000	5,108,000	14,155,000	17,720,000
February	8,588,000		5,933,000		16,815,000	
March	10,370,000		8,995,000		18,189,000	
First quarter	27,746,000		20,138,000			
April	11,726,000		12,771,000		17,159,000	
May	13,777,000		14,551,000		16,403,000	
June	13,538,000		15,036,000		14,903,000	
Second quarter	39,041,000		42,358,000			
July	14,029,000		16,614,000		12,319,000	
August	15,128,000		16,855,000		10,666,000	
September	14,519,000		16,827,000		8,404,000	
Third quarter	43,676,000		50,296,000			
October	14,820,000		17,160,000		6,073,000	
November	13,141,000		10,289,000		8,928,000	
December	10,435,000		5,506,000		*13,913,000	
Fourth quarter	38,396,000		32,955,000			
	148,859,000		145,747,000			

*Revised.

The imports in December were from Belgium, 82,016 bbl.; Norway, 43,036 bbl.; Esthonia, 33,368 bbl.; Denmark, 8,877 bbl.; England, 3,991 bbl.; Sweden, 1180 bbl.; Netherlands, 500 bbl.; Canada, 441 bbl.; other countries, 405 bbl.

The imports were received in the following districts: Los Angeles, 56,495 bbl.; Hawaii, 33,654 bbl.; Florida, 13,422 bbl; San Francisco, 12,504 bbl.; South Carolina, 12,123 bbl.; New Orleans, 10,711 bbl.; Porto Rico, 9032 bbl.; Washington, 8680 bbl.; Massachusetts, 8382 bbl.; Oregon, 7864 bbl.; other districts, 947 bbl.

The statistics of imports and exports of hydraulic cement in January, 1925, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924, IN BBL.*

Months	Imports 1923	Imports 1924†	Exports 1923	Exports 1924†
January	71,686	153,839	74,169	88,586
February	20,529	162,930	88,531	62,606
March	66,521	160,517	98,861	91,224
April	76,899	148,137	85,662	83,200
May	88,480	161,304	103,634	88,850
June	111,559	196,655	77,203	74,064
July	286,106	108,944	82,774	60,139
August	324,008	192,634	73,201	85,883
September	215,785	138,369	77,121	69,470
October	172,051	214,987	74,302	79,180
November	140,590	198,806	85,743	42,490
December	104,422	173,814	80,487	52,851
	1,678,636	2,010,936	1,001,688	878,543

*Compiled from records of the Bureau of Foreign and Domestic Commerce.
†Subject to revision.

The exports of hydraulic cement in December, 1924, were 52,851 bbl., valued at $163,639, of which there was sent to Cuba,

18,089 bbl.; to the other West Indies, 2500 bbl.; South America, 15,747 bbl.; Mexico, 9321 bbl.; Central America, 3354 bbl.; Canada, 487 bbl.; and to other countries, 3353 bbl. These exports are exclusive of shipments to the following possessions: Porto Rico, 10,633 bbl.; Alaska, 3866 bbl. The total exports in 1924 amounted to 878,543 bbl., valued at $2,615,154, which exports are exclusive of shipments to Porto Rico, 98,001 bbl.; Hawaii, 53,520 bbl.; Alaska, 19,877 bbl.

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during November, 1923 and 1924.

	November	
Shipped to—	1923 Barrels	1924 Barrels
Alabama	175,779	189,796
Alaska	231	231
Arizona	33,473	43,541
Arkansas	92,768	87,735
California	983,178	847,700
Colorado	79,879	89,116
Connecticut	115,275	114,986
Delaware	23,563	31,546
District of Columbia	53,837	62,633
Florida	122,383	220,005
Georgia	104,202	148,597
Hawaii	4,109	835
Idaho	35,613	11,300
Illinois	780,219	865,928
Indiana	312,937	267,367
Iowa	166,595	129,877
Kansas	223,398	172,934
Kentucky	125,482	153,650
Louisiana	107,195	104,021
Maine	30,486	20,649
Maryland	147,776	180,594
Massachusetts	287,555	265,416
Michigan	453,077	582,371
Minnesota	168,226	136,398
Mississippi	46,754	39,553
Missouri	325,350	362,170
Montana	12,172	8,974
Nebraska	85,946	83,880
Nevada	7,873	7,378
New Hampshire	26,810	27,402
New Jersey	506,189	463,036
New Mexico	18,544	11,492
New York	1,338,077	1,230,384
North Carolina	202,181	255,535
North Dakota	4,799	2,876
Ohio	581,811	646,386
Oklahoma	184,445	187,776
Oregon	72,939	68,474
Pennsylvania	867,119	945,003
Porto Rico	....	500
Rhode Island	47,766	44,833
South Carolina	48,074	57,325
South Dakota	13,662	15,263
Tennessee	111,177	140,872
Texas	253,087	314,451
Utah	33,709	17,579
Vermont	14,344	12,923
Virginia	149,839	144,604
Washington	115,707	91,356
West Virginia	121,813	114,229
Wisconsin	246,026	192,256
Wyoming	19,819	12,484
Unspecified	85,709	17,199
	10,168,977	10,243,419
Foreign Countries	82,023	45,581
Total shipped from cement plants	10,251,000	10,289,000

*Includes estimated distribution of shipments from three plants.

Bureau of Standards Investigates Weatherproofing Gypsum Block for Exterior Construction

GYPSUM, though satisfactory as a plaster and tile for interior work, has not proven satisfactory for exterior construction, the reason being its slight solubility in water. The present use of gypsum block is therefore mainly in the construction of partition in the interior of buildings. If this material could be so improved as to be more resistant to the weather there would immediately be opened a new market for gypsum block which has not as yet been touched. It is probable that if a method is found whereby gypsum block can be weatherproofed, the procedure may easily be modified so as to include such other products of gypsum as stucco, mortar, etc. With this in mind, an investigation of methods of weatherproofing gypsum has been undertaken by the Bureau.

In attacking this problem three general methods preseneted themselves. First, covering the set material with some waterproof coating in order to keep moisture from the gypsum; second, precipitating on the surface an insoluble compound formed by a reaction of some material with the gypsum; and third, by the addition of an integral waterproofing compound to the gypsum, which when the gypsum has set acts as a water repellent. In the beginning of the investigation many small cylindrical specimens of gypsum were made and treated in one of the ways described above, and then exposed to the weather. At definite intervals of time these were dried, weighed, and tested for absorption. At the end of one year's exposure, panels were made of the same composition as the small cylinders, which upon examination gave promise of satisfactorily withstanding the weather. These panels were exposed to the weather, and are now examined from time to time.

The first method, that of covering the set material with a waterproof coating, has so far given very promising results. Waterproof paints, varnishes, shellacs, whitewashes, paraffins, waxes, stearic acid, etc., have been used. The paints, varnishes, shellacs and whitewashes were not satisfactory, but with paraffin, waxes, and stearic acid very good results were obtained.

However, the second method, that of precipitating on the surface an insoluble compound formed by the reaction of some material with gypsum, has so far proven the most successful. Cylinders of neat gypsum and 1:1 sanded gypsum were made, and when approximately dry were immersed in solution of barium chloride, sodium carbonate, ammonium phosphate, ammonium oxalate, lead acetate, and barium hydroxide. The results obtained with all of the salt solutions did not warrant the recommendation of any of them as weatherproofing materials. However, in the case of hot barium hydroxide, the results were very promising. The success of this material as a means of weatherproofing gypsum is explained by assuming that the barium hydroxide, which penetrates the pores of the gypsum, reacts with the calcium sulphate to form the more or less insoluble compound, barium sulphate. This very slightly soluble barium sulphate coating on the surface of the gypsum cylinder makes it very resistant to the weather. This protection, however, is only temporary, for after a period of approximately two years' exposure the cylinders begin to weather away about as fast as do the cylinders of untreated neat gypsum. After this period, it is probable that another application of the barium hydroxide solution would protect the gypsum for a similar length of time. This is being investigated.

The third method, by the addition of an integral waterproofing compound to the gypsum, which when the gypsum has set acts as a water repellant, has not given promise of good results. Among the integral waterproofing compounds used have been: zinc stearate, glue, gum tragacinth, gum arabic, glycerine, dextrin, and water glass. None of them seems to waterproof the gypsum for any length of time.

Examinations of the panels and cylinders is made from time to time, and as new methods of treatment come to our attention, cylinders are made and exposed for observation.—*Bureau of Standards Technical News Bulletin No. 94.*

Effect on Permanent Pastures of Treatment With Limestone and Acid Phosphate

ACCORDING to an article in *Chemical Abstracts* by F. M. Schertz on *J. Am. Soc. Agron.* 16, 241-51 (1924): Limestone and acid phosphate on "worn out" pastures in southeastern Ohio caused an immediate increase in the percentage of legumes. This is followed by a renewal of bluegrass sod, which does not reach its optimum until at least the end of the fourth summer after treatment. The greatest difference in chemical composition between the vegetation produced on treated and untreated portions of the same field is found in the percentage content of nitrogen. The percentage increase in the content of calcium in the vegetation as a result of an acid phosphate and limestone treatment is greater than the percentage increase in its content of phosphoric acid.

Committee Meeting of the National Sand and Gravel Association Ends in a Fire

IN accordance with the policy announced at the annual convention, the executive committee of the National Sand and Gravel Association is holding meetings in different parts of the country in order to meet the producers of each section and to have a more thorough understanding of local conditions. One of these meetings was recently held at Montgomery, Ala., which is the largest sand and gravel producing section in the south and one of the largest in the United States. About 20 producers were present and the meeting was a very pleasant affair. But it was brought to a close by a fire in the Gay-Teague hotel, in which the meeting was being held. Fortunately, no great amount of damage was done by the fire.

Cement Products

TRADE MARK APPLIED FOR WITH U.S. PATENT OFFICE

A Unique Demonstration of Fire Resisting Properties of Concrete Tile

Report of the Los Angeles Fire Test

By Fred T. Abram
With Los Angeles Office of Portland Cement Association

IT isn't often that a fire can be scheduled several days in advance, so that anyone who wants to see the conflagration may be on hand in time to witness it from the time the first spark ignites until the last ember is extinguished.

Last November, a fire of this sort took place, and no other person that Mayor Cryer of Los Angeles, applied the torch. "Hizzoner" seemed to enjoy the part of Nero—notorious as the "Fiddling Firebug" —who did the unforgettable stunt of fiddling

The house before burning and the notice which was not scorched although it was near the house

Left—The hand could be placed on the walls while the fire inside was at its hottest. Right—After the fire was put out—still smoking

while Rome burned—and did his stuff enthusiastically while the cameras clicked and the crowd smiled its approval. Present also were Boyle Workman, president of the city council, and Fire Chief Scott, who was on hand to put out the fire.

The building was constructed of hollow concrete tile by several manufacturers of concrete hollow tile in and around Los Angeles for the purpose of showing just how much of a blaze a building constructed of this modern material could stand without being destroyed.

A good crowd was on hand to witness the demonstration and speculation was rife as to just what would happen to the building after the torch was applied.

At the appointed time Cryer applied the torch to the oil soaked wood, with which the building had been filled. After heavily smoking for five minutes the flames made their way through the wooden door and window frames. Encouraged by the draft provided by the open door and windows the fire gained rapid headway and in a few minutes the interior was like the inside of a blast furnace. Intense heat developed and flames burst through the door and windows and severely attacked the cornice and the roof. The cornice was made fireproof by covering the wooden rafters with expanded metal lath and stucco which made it impossible for the fire to get under the concrete tile roof. This feature has proved itself necessary to the firesafeness of any building.

Arrangements were made with the Raymond G. Osborne laboratory for taking the temperature inside the building during the progress of the fire. By means of a pyrometer, temperature readings were taken through a pipe extending through the tile wall of the building on the front side to the left of the door. The fire end of the pyrometer extended through the wall and approximately one foot into the building. Although this pyrometer registered 1800 degrees at its maximum point, the outside walls of the building remained cool to the touch during the entire progress of the fire, thus graphically illustrating the claim of concrete products men that hollow concrete masonry serves as insulation against temperature changes and that houses of this material are warm in winter and cool in summer. An idea of the intense heat to which the blocks were subjected can be realized when it is taken into consideration that the melting point of bronze is 1692 deg. F., while cast iron melts at 2000 deg. F., and some steel at 2500 deg. F. This overheating of the inside of the walls, while the outside remained cool, naturally set up unequal expansion and resulted in some of the outside mortar joints opening slightly.

After burning intensely for about 40 minutes, when the tile were in a superheated condition, Chief Scott gave the order and the firemen stuck the hose nozzle into the door and applied the full force

Mayor Geo. E. Cryer of Los Angeles starting the fire

of the stream directly to the interior face of the block. A cloud of steam came through the openings and the fire was extinguished. After the severe test of a heavy stream of cold water under engine pressure applied to the extremely hot walls from a distance of only a few feet, close inspection disclosed the fact that not a single crack was in evidence in either the block or the concrete sills and lintels. The portland cement plaster on expanded metal lath ceiling prevented the fire reaching the wooden roof framing.

In the opinion of the public officials who witnessed the demonstration the test was quite remarkable. Mayor Cryer said, "I was greatly surprised to find while the fire was at its height the outer surface was still cool. I am in favor of this type of construction, from the standpoint of both economy and fire protection, and I believe the time will come when cities will demand such construction." "I am in favor of any type of construction which will reduce fire hazards, and this demonstration has proven that this type of construction is most satisfactory," said Chief Scott. The experienced fire fighters fully expected the walls to crack and crumble when the cold water was applied and they were much impressed with the performance of the concrete tile walls when they withstood the intense fire, characterized as hotter than any similar fire could ordinarily be within the city limits before the fire department got into action and subdued it.

The test also demonstrated that in many cases fires which would undoubtedly sweep an entire city block can be stopped by a concrete building. This is illustrated by the accompanying photograph showing the sheets bearing the typewritten announcement and details of the demonstration on the front of the building only slightly scorched, from the flames leaping through the window at the side of the building.

This demonstration on the part of the progressive concrete tile manufacturers who cooperated in the event did more than just prove that concrete construction is the foremost barrier to fire. It brought home to the general public the sound structural qualities that concrete hollow tile construction provides for building permanently and rigidly, unaffected by time and the elements and that when covered with portland cement stucco it creates a beautiful structure comparable in attractiveness with the best of all other materials.

Details of Construction

The building was 10 x 12 ft. in size; walls 12 in. thick, consisting of two 6-in. tile parallel to each other. Five types of hollow concrete tile were used, as follows:

"Flam Tile"—Manufactured by Coast Concrete Products Co., East Slauson avenue, Los Angeles.

"K-Tile"—Manufactured by Knoblaugh and Tuttle, Inc., 335 South Palm avenue, Alhambra.

"Lac-Tile"—Manufactured by Los Angeles Concrete Tile Co., 520 I. W. Hellman building, Los Angeles.

"Tylite"—Manufactured by California Tylite Co., 4707 Hollywood boulevard, Los Angeles.

"Stone-Tile"—Manufactured by Concrete Brick and Tile Co., 440 South San Fernando road, Glendale. Fillmore-Wiley Co., 2002 West Slauson avenue, Los Angeles; Pacific

The fire was attended by a large number of interested spectators

Tile Co., East Colorado street, Pasadena, and Bent Concrete Pipe Co. (San Diego branch).

The chimney consisted of a single thickness of 6-in. concrete hollow tile, faced with concrete brick, manufactured by the Southern California Shope Brick Co., Lamanda Park.

The art piece over the door was furnished by the Western Art Stone Works, 5601 Alhambra avenue, Los Angeles.

The mortar used was portland cement and lime mortar furnished by the Atlas Mixed Mortar Co., Los Angeles.

The ceiling joists, rafters, roof sheeting, windows and door were of wood. The ceiling consisted of expanded metal lath, furnished by the General Fireproofing Co., 1920 Atlantic street, Los Angeles, and covered by portland cement plaster about 1¼ in. thick.

The roof was of concrete roof tile, furnished by the Pacific Coast Concrete Co., Los Angeles. On one side of the roof solid red, flat tile was used, while on the other side variegated Spanish tile was used to illustrate the variety of shapes and colors in which concrete roof tile may be used.

$170,000 Worth of Artificial Stone Made in San Antonio, Texas, in Year

According to a statement in the *San Antonio (Texas) News,* a total of $170,000 worth of artificial stone is made annually by four manufacturers of that city.

These concerns ship a considerable part of their products throughout Texas and neighboring states.

Slate Flour Used for Waterproofing Concrete Products

[The slate flour referred to in the following is produced as a byproduct in slate manufacture, especially in the manufacture of roofing granules.—Ed.]

Recent reports show that the comparative failure of some of the concrete block construction used in recent housing schemes is entirely due to their great porosity, and it is a fact that many local authorities are experiencing difficulty in their deliberations as to what should be done to remedy this defect.

It is realized that too little attention has been paid to this question of waterproofing, and, whilst it has been said that it is possible to obtain concrete absolutely waterproof, provided the materials are graded so as to get the maximum density—i.e., reduce the voids to a minimum—the writer has never yet obtained a waterproof concrete where the thickness has been 1 in. or less, and the water has been applied under pressure. In his opinion nothing better than 1:2:4 concrete will stand water under a 5-ft. head.

In addition to the tests mentioned, tests have been, and are being, carried out to ascertain the waterproofing qualities of certain materials, and some interesting results have been obtained by the addition of slate flour to the mix.

The slate flour is a perfectly inert filler, and depends for its waterproofing qualities upon its fineness of grinding and its ability to mix with the other materials, and not upon its expansion.

It should be noted here that materials which are claimed to expand in the mix may be dangerous to use.

With the slate flour it is found that if the material is not too wet, and the filler is used in proportions varying from 2% to 18%, good results are obtained every time.

The test specimens used were discs 1½-in. thick, consisting of standard sand and cement, and aggregate to pass a ⅜-in. mesh, and it has been noted that the strength of the resulting concrete increases, for equal plasticity, with the amount of slate flour used, up to 12% of the latter, whilst where the amount is from 12% to 20%, the reduction in strength is very small.—*Contract Journal (England).*

Concrete May Solve Tenement House Construction Problems

Indications that tenement house construction will be an important factor in the New York building situation this year lend additional emphasis to the recent plea of Tenement House Commissioner Mann for more and better construction in this type of housing, according to B. H. Wait, district engineer of the Portland Cement Association, who said:

"With construction costs still at high levels, the problem of building tenements which will return a reasonable rate on the necessary large investment is still a serious one, and unless architects and builders profit by what has been done in other cities in the way of cutting construction cost without sacrifice of stability, the housing situation in this class of homes is likely to remain acute."

Continuing, Mr. Wait pointed to a large operation on Long Island completed last year, in which a group of 50 apartments were successfully built of reinforced concrete. With the use of concrete block and tile for bearing wall construction he claimed that builders in the eastern states have been effecting substantial reductions in the cost of their masonry construction.

Mr. Wait pointed to the enormous growth of the concrete products industry in the last few years as proof of his assertions, mentioning specifically the thousands of stores and apartments built of this construction in Brooklyn since the war.

"As Commissioner Mann stated recently, the housing situation in New York will never be solved by speculative housing operators who build cheaply for quick sales and unload upon the unsuspecting would-be house owner."—*New York Herald-Tribune.*

Burkestone

"Burkestone" is the name that has been adopted by the manufacturers of a new concrete product being made in Kansas City, Mo. It resembles marble so closely that ordinary inspection cannot tell the difference. It is named after its inventor, J. J. Burke, an architect of Tulsa, Okla.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30 per net ton all sizes					
Chaumont, N. Y.	1.00	......	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	......
Northern New Jersey	......	......	1.60	......	......	......
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	......
Walford, Penn.	......	......	1.35	1.50	1.60	1.60
Watertown, N. Y.	1.00	......	1.75	1.50	1.50	1.50
Western New York	1.15	1.20	1.20	1.20	1.15	1.15
CENTRAL						
Alton, Ill.	1.75	......	1.75	......	......	......
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.10	1.00	1.00
Buffalo, Iowa	1.10	......	1.45	1.25	1.30	1.30
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.15	1.20	1.20	1.20	1.10	1.10
Cypress, Ill.	1.20	1.20	1.15	1.20	1.25	1.25
Dundas, Ont.	.75	1.00	1.00	.90	.90	.90
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.10	.90	.90	.90
Linwood, Iowa	1.00	1.25	1.25	1.05	1.05	1.15
Northern New Jersey	1.30	......	1.80	1.60	1.40	......
St. Vincent de Paul, P. Q.	1.00	1.45	1.10	1.00	.95	......
Stone City, Iowa	.75	......	1.20†	1.10	1.05	......
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50@1.50	......	1.10	1.00	1.00	......
Youngstown, Ohio	......	......	......	1.50	1.60	1.60
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	......
Bridgeport, Texas	1.00	1.00@1.35	1.35	1.25	1.25	1.10
Cartersville, Ga.	2.70	1.50	1.50	1.35	1.35	1.35
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	......
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	......
Graysville, Ga.	1.00	......	.85@1.10	.85@1.00	.85@1.00	
WESTERN:						
Atchison, Kans.	.50	......	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.25	......	1.25	1.25	1.00	......
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	......
Duluth, Minn.	1.00	2.25	1.75	1.50	1.30	1.30
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	......
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.15	1.60	1.60	1.50	1.35	1.35
Minneapolis, Minn.	1.25	......	2.25	2.00	1.75	......
Northern New Jersey	1.60	2.20	2.00	1.60	1.60	......
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	......
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	2.00	2.10	2.20	1.80	......	......
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10
New Haven, Conn.	.60	1.70	1.45	1.20	1.05	......

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	......
Columbia, S. C.—Granite	1.50b	2.00	2.00	1.75	1.75	......
Eastern Penn.—Sandstone	1.30	1.55	1.50	1.50	1.30	1.30
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75(c)	1.50	1.50	1.25	1.10	......
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	......
Middlebrook, Mo.—Granite	3.00@3.50	......	2.00@2.25	2.00@2.25	......	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	......
Richmond, Calif. (Basalt)	.75*	......	1.50*	1.50*	1.50*	......

*Cubic yd. †1 in. and less. ‖Rip rap per ton; (b) dust out; (c) sand.

Agricultural Limestone

(Pulverized)

Alton, Ill. — Analysis, 98% $CaCO_3$; 90% thru 100 mesh 6.00

Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Cartersville, Ga. — Analysis, 68% $CaCO_3$, 32% $MgCO_3$; pulverized 2.50
90% thru 4 mesh 1.50

Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk 2.50

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk 3.00

Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk 3.60

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton 2.00

Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh ...... 3.90@ 4.50

Mountville, Va. — Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags 5.00

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ...... 2.10@ 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk 3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; bags, 4.00; bulk 2.50

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Agricultural Limestone

(Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50

Alton, Ill.—Analysis 98% $CaCO_3$; 50% thru 4 mesh 1.75

Bedford, Ind.—Analysis, 98½% $CaCO_3$, ½% $MgCO_3$; 90% thru 10 mesh 1.50

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Blackwater, Mo.—77% $CaCO_3$; 100% thru 8 mesh, 25% thru 100 mesh 1.00

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.75
50% thru 4 mesh 1.50

Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; 50% thru 100 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.15
Cypress, Ill.—50% thru 100 mesh	1.25
90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 52% $CaCO_3$, 44% $MgCO_3$; meal, 100% thru 4 mesh, 35% thru 100 mesh	.75@ 1.50
Milltown, Ind.—Analysis, 94.41% $CACO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh .38% thru 50 mesh	1.45@ 1.60
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk	2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Waukesha, Wis.—Bulk	4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

Glass Sand:

Berkeley Springs, W. Va	2.00@ 2.25
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass: 6.00 to 7.00 per ton; bbl	2.50
Columbus, Ohio	1.25@ 1.50
Estill Springs and Sewanee, Tenn.	1.50
Grays Summit and Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Ohlton, Ohio	2.50
Ottawa, Ill.—Chemical and mesh guaranteed	1.50
At market	1.00
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.: Bank run	1.50
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Zanesville, Ohio	2.50

Miscellaneous Sands:

Aetna, Ind.:	
Core, Box cars, net, .35; open-top cars	.30
Albany, N. Y.:	
Molding fine, brass molding	2.75
Molding coarse	2.75
Sand blast	4.50
Arenzville and Tamalco, Ill.:	
Core	1.00
Molding coarse	1.50
Molding fine	1.50@ 1.75
Brass molding	2.00
Beach City, Ohio:	
Fine core	1.75
Furnace bottom	2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Farmingdale, N. J.	.83	.73	1.20	1.20	1.35	
Leeds Jct., Maine		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Penn.	1.00	1.10	1.00	1.00	1.00	.90
Northern New Jersey		.40@ .80	1.25	1.50	1.50	
Pittsburgh, Penn., and vicinity	1.25	1.25	1.05	1.05	.85	.85
Shining Point, Penn.			1.00	1.00	1.00	1.00
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75@1.00
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.30	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.85@1.25			.85
Elkhart Lake, Wis.	.60	.60	.80	.80	.80	.80
Ft. Dodge, Iowa	1.00		2.05	2.05	2.05	
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.		.60		.90	.80	.80
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.		.40	1.25		1.25	
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.35	.35	1.35	1.25	1.25	1.25
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65§	1.45		1.45§
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.90	.90	.90	.85
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.55	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .40@.60			
Zanesville, Ohio	.70	.60	.60	.60	.90	
SOUTHERN:						
Brookhaven, Miss., Roseland La.	1.75*	.70	2.25	1.50	1.25	
Charleston, W. Va.	All sand 1.40 f.o.b. cars.		All gravel 1.50 f.o.b. cars.			
Chehaw, Ala.	1.24	1.24		1.90	1.90	1.90
Estill Sp'gs & Sewanee, Tenn.	1.00	.90	1.00	1.00	.85	.85
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.50	.50			.65	.65
New Martinsville, W. Va.		.90		1.30		.90
Smithville, Texas	1.00	1.00	1.00	1.00	1.00	1.00
WESTERN:						
Baldwin Park, Calif.		.25@ .35			.50@ .75	
Crushed rock	.90@1.10	.60@ .90	.60@ .90	.60@ .90	.60@ .90	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif.		.40	.50	.65	.60	.60
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.	.50	.50	1.20	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.		Road gravel, ballast gravel .60 a ton				
Chehaw, Ala.	.90@1.00					
Des Moines, Iowa		Washed, .50; unwashed, .40 (not screened)				
Dudley, Ky.	1.15	1.15		.95		
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.55		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.		Mixed gravel for concrete work, .65				
Lindsay, Texas						.55
Macon, Ga.		.35				
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				
Zanesville, Ohio		.60				

*Cubic yd.; (a) ¾ in. and less; (b) river run.

Miscellaneous Sands

(Continued from preceding page)

Molding fine and coarse		2.00
Traction unwashed and screened		1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse		5.00
Sand blast	5.00@	8.00
Stone sawing		6.00
Columbus, Ohio:		
Core	.30@	.50
Furnace lining, molding coarse	2.00@	2.25
Molding fine	2.50@	2.75
Sand blast	4.00@	4.50
Stone sawing		1.50
Traction	.50@	.75
Brass molding	2.50@	3.00
Dresden, Ohio:		
Core	1.25@	1.50
Molding fine	1.50@	1.75
Molding coarse		1.50
Traction		1.25
Brass molding		1.75
Dunbar, Penn.:		
Traction (damp)		2.00
Eau Claire, Wis.:		
Sand blast	3.00@	3.25
Elco, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Estill Springs and Sewanee, Tenn:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Core		2.00
Molding coarse and fine		1.75
Grays Summit, Mo.:		
Molding fine	1.75@	2.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Klondike, Mo.:		
Molding fine	1.75@	2.00
Mapleton Depot, Penn.:		
Molding fine, traction		2.00
Massillon, Ohio:		
Molding fine, coarse, furnace lining core and traction		2.50
Montoursville, Penn.:		
Core	1.25@	1.35
Traction		1.00
Brass molding		1.50
New Lexington, Ohio:		
Molding fine		2.75
Molding coarse		2.25
Ohlton, Ohio:		
Core, furnace lining, molding fine and coarse, all green		2.00
Roofing sand, sand blast, stone sawing traction, all green		1.85
Add 50c a ton for green sand dried.		
Oceanside, Calif.:		
Roofing sand (stucco)	3.00@	3.40
Ottawa, Ill.:		
Crude silica sand	1.00@	1.25
Core, furnace lining		1.25
Roofing sand, brass molding	1.25@	2.50
Sand blast, stone sawing		4.00
Traction		1.00
Pacific, Mo.:		
Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgway, Penn.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Round Top, Md.:		
Core		1.60
Traction, damp		1.75
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25@2.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
E. Canaan, Conn.	3.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	2.50*	1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45		1.45		1.45	1.45
Jackson, Ohio		1.05		1.30	1.05	1.30	1.30
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

*Clean.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		10.00	9.00	12.00				
Lime Ridge, Penn.							5.00a	
Williamsport, Penn.			10.00				6.00	
York, Penn.		11.50	10.50	11.50			8.00	1.65i
CENTRAL:								
Cold Springs, Ohio		9.00	9.00		9.00	11.00		
Delaware, Ohio	12.50	10.00	9.00	10.50			9.00	1.50
Gibsonburg, Ohio	12.50							
Huntington, Ind.	12.50	10.00	9.00		9.00	11.00	9.00	
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		10.00	9.00	12.00			9.00	1.50c
Marion, Ohio		10.00	9.00				9.00	1.50c
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70e
Tiffin, Ohio		10.00						
White Rock, Ohio	12.50				9.00	11.00	9.00	1.50c
Woodville, Ohio	12.50†	9.00†	8.50†		9.00	10.50	8.00	1.60
SOUTHERN:								
Erin, Tenn.							7.80	1.25
El Paso, Texas	23.50						10.50	1.75
Graystone & Wilmay, Ala.	12.50	11.00		11.00			8.50	1.50
Karo, Va.		10.00	9.00				7.00g	1.65h
Knoxville, Tenn.	20.00	11.00		11.00		1.35	8.50	1.50
Varnons, Ala. (f)	11.00p	11.00p			9.00	.90	8.50q	1.50r
Zuber and Ocala, Fla.	14.00	12.00	10.00				12.00	1.70
WESTERN:								
Kirtland, N. M.							15.00	
San Francisco, Calif.	22.00	22.00	15.00	22.00			14.50n	2.50o
Tehachapi, Calif.							16.20	

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) wood bbl., $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200 lb. bbl.; 2.65, 300 lb. bbl.; (l) bags; (m) finishing lime, 2.50 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50
San Francisco, Calif. (Direct from Pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Furnace lining	.75@	1.00
Molding fine		.75
Molding coarse		.85
Utica, Penn.:		
Core, molding fine, brass molding		2.00
Molding coarse		1.75
Warwick, Ohio.:		
Core, molding coarse (green) 2.00; (dry) 2.50; traction		2.50
Zanesville, Ohio:		
Sand blast, core, traction	2.00@	3.00
Furnace lining		2.25
Molding fine and coarse; brass molding	2.00@	2.25

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude (for grinding)		6.00
Ground (150-200 mesh) 200 lb. bags		10.00
Pencils and steel workers crayons	1.50@	2.50
Chester, Vt.:		
Ground (20-70 mesh)	7.00@	8.00
Ground (150-200 mesh)	9.00@	10.50
(Bags extra, returnable)		
E. Granville, Rochester, Johnson, Waterbury, Vt.:		
Ground talc (20-50 mesh) bags	7.00@	10.00
Ground talc (150-200 mesh) bags	10.00@	25.00
Pencils and steel workers' crayons, per gross	.75@	2.00
Emeryville, N. Y.:		
(Double air floated) including bags; 325 mesh (50 lb. paper, 100 & 200 lb. burlap bags)		14.75
Hailesboro, N. Y.:		
Ground (150-200 mesh) bags		18.00
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	2.75@	3.50
Ground (150-200 mesh), bags	9.00@	14.00
Joliet, Ill.		
Ground (200 mesh), bags		30.00
Marshall, N. C.:		
Crude	4.00@	8.00
Ground (20-50 mesh), bags extra	6.50@	8.50
Ground (150-200 mesh), bags	8.00@	12.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), 200-lb. bags		13.50
50-lb. bags		14.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	4.50
Mt. Pleasant, Tenn.—B.P.L. 75-78%	6.50@	8.00
75% hand mined		6.50
75% (free of fines for furnace use)		6.75
75% max. 5½% I and A	6.50@	7.00
78% max. 4½% I and A		8.00
75/78 B.P.L.	6.50@	8.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%		7.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	5.00
Mt. Pleasant, Tenn.—B.P.L. 65% 95% thru 100 mesh	6.50@	7.50
B.P.L. 13%. 95% thru 80 mesh		5.75
Twomey, Tenn.—B.P.L., 65%	7.00@	8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10, 18x10, 18x9, 18x12	12.60	11.00	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x8	11.10	10.50	8.10	7.80
14x7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Florida Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.25
70% min. B.P.L., Basis 70%	2.50
72% min. B.P.L., Basis 72%	2.75
75/74% B.P.L., Basis 75%	3.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	20.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per gross ton	18.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars	—	10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries	—	17.50
Crown Point, N. Y.—Mica Spar	—	7.00@ 8.00
Easton, Penn. — Light and dark granite	20.00	*18.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio (in bags)	—	5.00@22.00
Middlebrook, Mo.—Red	—	20.00@25.00
Milwaukee, Wis.	—	14.00@34.00
Newark, N. J.—Roofing granules	—	7.50
New York, N. Y.—Red and yellow Verona	—	32.00
Poultney, Vt., 2000 lb.	—	6.12
Red Granite, Wis.	—	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — Sized rock for roofing and stucco dashes, CL lots	—	12.00
Tuckahoe, N. Y.—2000 lb.	—	12.00
Wauwatosa, Wis.	—	20.00@34.00

*In bags; bulk $16.00.
†C.L. Less than C. L., 15.50.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@17.00	22.00@50.00
Ensley, Ala. ("Slag-tex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	14.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	15.00	20.00
Portland, Ore.	19.00	25.00@45.00
Prairie du Chien, Wis.	14.00	22.00@30.00
Puyallup, Wash.	20.00	30.00@90.00
Rapid City, S. D.	18.00	25.00@45.00
Salem, Ore.	23.00	90.00@100.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00@18.00	30.00@42.00

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich. (wholesale)	10.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Plant City, Fla.	11.00@15.00
Portage, Wis.	15.00
Brighton, N. Y.	16.75
Saginaw, Mich.	13.00
San Antonio, Texas	12.50@14.00
Syracuse, N. Y.	15.00@17.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	—
Denver, Colo.	24.00	—
Detroit, Mich.	16.00	—
Minneapolis, Minn. (white)	23.00	21.00
Montreal, Que.	—	21.00
New York, N. Y.	18.20	13.10

Philadelphia, Penn.	23.00	16 00
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.00	—
Seattle, Wash. (paper sacks)	24.00	—

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Albany, N. Y.	—	2.62
Atlanta, Ga.	—	2.35
Boston, Mass.	—	3.03
Buffalo, N. Y.	—	2.38@2.88†
Cedar Rapids, Iowa	—	2.44
Cincinnati, Ohio	—	2.47
Cleveland, Ohio	—	2.39
Chicago, Ill.	—	2.20
Columbus, Ohio	—	2.42
Dallas, Texas	—	2.15
Davenport, Iowa	.53¾	2.39
Dayton, Ohio	—	2.38
Denver, Colo.	—	2.55
Detroit, Mich.	.63¾	2.35
Duluth, Minn.	—	2.19
Indianapolis, Ind.	—	2.41
Kansas City, Mo.	—	2.07
Los Angeles, Cal. (less 5c dis.)	.51¾	2.60
Memphis, Tenn.	.63	2.60
Milwaukee, Wis.	—	2.35
Minneapolis, Minn.	—	2.42
Montreal, Canada (sks. 20c ext.)		
New Orleans, La.	—	1.90a
New York, N. Y.	—	2.40
Peoria, Ill.	2.65	2.15†
Philadelphia, Penn.	2.81	2.37
Phoenix, Ariz.	.82½	2.41@2.81†
Pittsburgh, Penn.	—	3.65
Portland, Ore.	—	2.19
San Francisco, Cal.	—	3.05
St. Louis, Mo.	.65¼	2.61*
St. Paul, Minn.	.55	2.20
Seattle, Wash. (10c bbl. dis.)	—	2.42
Toledo, Ohio	—	2.65
		2.40

NOTE—Add 40c per bbl. for bags.
*5c cash disc 10 days.
†Prices to contractors, including bags.
(a) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl
Buffington, Ind.	—	1.95
Concrete, Wash.	—	2 60
Dallas, Texas	—	2.10
Fordwick, Va.	—	2.05
Hannibal, Mo.	—	2.05
Hudson, N. Y.	—	2.05
Kingsport, Tenn.	—	2.05
Leeds, Ala.	—	1.95
Louisville, Ky.	.64¼	2.45
Northampton, Penn.	—	1.95
Steelton, Minn.	—	2.00
Universal, Penn.	—	1.95

Cement Products

Hawthorne tile, carload lots, f. o. b. plant.

	Cicero, Ill. Per sq.	Ft. Worth, Tex. Per sq.
Silver gray	—	8.00
Red French	9.50	9.00
Green French	11.50	10.00
Red Spanish	12.00	9.00
Green Spanish	14.00	10.00

	Cicero Red	Cicero Green	Ft. Worth Gray	Ft. Worth Red	Ft. Worth Green
Ridges	.25	.35	.25	.25	.30
Hips	.20	.30	.14	.14	.17
Ridge closers	.05	.06	.06	.06	.06
Hip terminals, 3 way	1.25	1.50	1.00	1.00	1.25
Hip starters	.50	.60	.22	.22	.25
Gable finials	1.25	1.50	1.00	1.00	1.25
Gable starters	.20	.30	.14	.14	.16
End bands	.20	.30	—	—	—
Eave closers	.06	.08	.06	.06	.06

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Agatite, Texas (a)	—	—	6.00	10.00	10.00	10.50	10.00	—	19.00	—	—	—	—
Akron, N. Y. (a)	3.00	4.00	6.00	10.00	10.00	10.00	20.20	7.00@9.00	27.35	21.00	19.375	20.00	30.00@32.00
Blue Rapids, Kans. (a)	2.50	4.00	6.00	10.00	10.00	10.50	10.00	—	23.15	19.00	19.375	20.00	—
Douglas, Ariz.	—	—	7.00	—	16.50	—	19.50	—	—	15.50	—	—	—
Ft. Dodge, Iowa (a)	2.50	4.00	6.00	10.00	10.00	10.50	15.45	—	22.70	20.00	19.375	20.00	30.00
Grand Rapids, Mich.	2.65*	6.00†	6.00†	7.00‡	—	10.00‖	—	—	—	—	—	—	—
Gypsum, Ohio (a)	2.75	4.00	6.00	10.00	10.00	10.00	19.25	7.50	26.85	19.00	19.375	20.00	30.00
Hanover, Mont.	—	—	—	11.80	—	—	—	—	—	—	—	—	—
Port Clinton, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	21.00	7.00	30.15	20.00	—	20.00	30.00
Portland, Colo.	—	—	—	10.00	—	—	—	—	—	—	—	—	—
San Francisco, Calif.	—	—	9.85	—	14.40	—	15.40	—	—	—	—	—	—
Winnipeg. Man.	5.50	5.50	7.00	13.50	15.00	15.00	—	—	—	—	28.50	—	15 00

NOTE—Returnable Bags, 10c each; Paper Bags, 1.00 per ton extra (not returnable).
*To 2.75; †to 8.00; ‡to 10.00; ‖to 12.00; (a) prices are net of bags.

New Machinery and Equipment

New Roller Bearing Sheave for Dragline Operation

SAUERMAN BROS., Chicago, the well-known makers of draglines, hoists and buckets, have introduced a new accessory to their slackline cableway which is a good illustration of how improving an operation in one respect is apt to improve it in every respect.

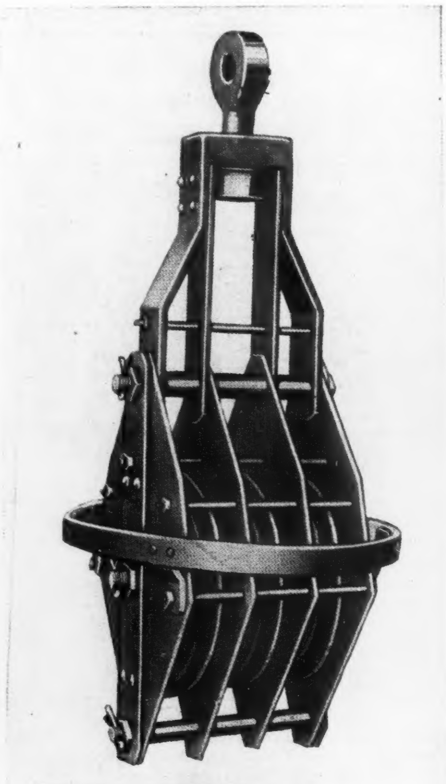
The device is a roller bearing block

The dragline with new block in operation

through which the tension rope is reeved. This rope is the one that is drawn tight by the hoist in order to tighten the main cable and thus raise the bucket from the digging to the traveling position. The purpose of making this block with roller bearings was only the obviate as far as possible the nuisance of having to climb up the mast, or tower, and oil the block. This had to be done frequently before the roller bearing block was introduced.

It was found that with the roller bearing block the speed of operation was materially increased. The promptness with which the bucket was raised and lowered and with which the return trip of the bucket was made took off some seconds from the time required for the cycle of operations and meant several more buckets discharged daily. This was somehing that even the engineer who designed the device had not anticipated.

The new block was at first applied only to the larger sizes of draglines, but its



Roller-bearing block for dragline operation

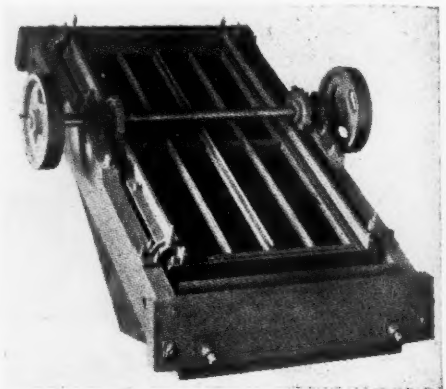
success was so marked that the owners of the "Junior" equipment, mostly used by contractors, insisted on having them so now it is made for all sizes.

Improved Impact Screen

THE Improved Impact Screen is made by the Colorado Iron Works, Denver, Colo. This firm has been making impact screens for a good many years and has sold more than 2000 of them for work in all parts of the country. The field of this screen is in screening material from ½-in. down, which in the rock products field adopts it to screening the finer sizes of crushed stone and sand.

The improved impact screen differs from the original only in improvement of the screen suspension and details of the operating mechanism. The new suspension is by a pair of steel cables stretched between the end members of the stationary frame and drawn as tight as a violin string. These take the place of the eliptical springs formerly used. They respond more sharply than springs could and they have a longer life than the springs had.

Vibration in this screen is produced by the teeth of a rotary cam which depresses a cam plate several times for each revolution of the cam shaft. Important improvements in this mechanism have been made in this new screen. The cams are protected from dust by a steel housing and a flexible wire grease distributor has solved the problem



The improved impact screen

of lubricating the rapidly moving cam. The cam plate is now made of manganese steel to give it a longer life and is reversible.

The effect of the motion of the impact screen is to stratify the grains so that the smallest grains go to the bottom and hence are nearest the screen surface. This gives the screen a large capacity for the amount of screen area used.

The machine is made in two sizes, 2x4 ft. and 3x6 ft. The discharge is arranged to easily permit delivery to another screen where the screens are run in series.

Gas Saver for Welding and Cutting Torches

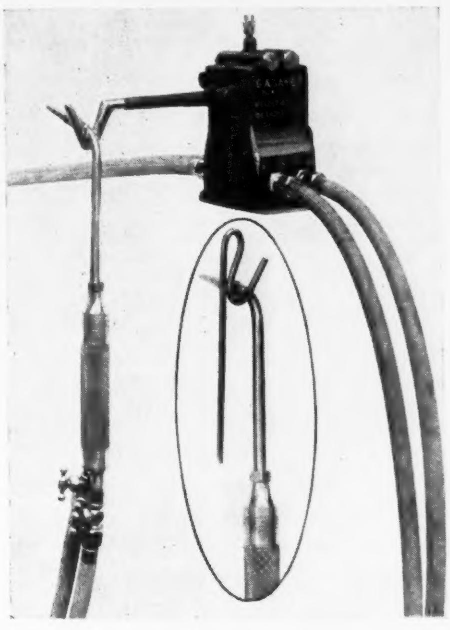
IN every plant where acetylene welding and cutting equipment is the use the average torch is lighted at the start of a job and remains lighted until the job is completed or the work is stopped. The torch is consuming oxygen and acetylene regardless of whether it is hanging up while the work is being adjusted or the welder is away from his bench, or for any other reason. This has always been considered necessary on account of the loss of time and gas required to adjust the flame after the torch has been shut off.

The Weldit Acetylene Co., Detroit, Mich., has recently put on the market a device

known as the "Weldit Gasaver," which obviates the condition described above.

By using this "gasaver" the welding operator adjusts the correct flame in the torch at the beginning of the day and when new work is being set, jigs turned or welding wire secured, the torch is hung on the handy arm projecting from the "gasaver" and is immediately extinguished. This stops the flow of oxygen and acetylene. Upon lifting the torch down from the arm and passing it over a convenient pilot light at the top of the "gasaver," it is instantly lighted with the same set flame as originally adjusted.

The "gasaver" is located between the regulators of the torch and all gas must pass



The new device compared with the old plain hook for hanging torch

through it. It is fitted with automatic shut-off valves, operated by the weight of the torch on the projecting arm.

The company claims for this device a saving of at least 25% in the amount of oxygen and acetylene used. It has the approval of welders because it is simple and provides a handy place to hang the torch when not in use; it has the approval of safety engineers because it eliminates the danger of a burning torch swinging and

The weight of the torch pulls the hook down and shuts off the gas

igniting a workman's clothing. The check valves on this device eliminate the danger of flashbacks reaching regulators and tanks.

The "gasaver" can be used with any make of welding apparatus.

Vertical and Angle Worm Gear Reducers

VERTICAL drives for agitators, mixers, dryers, screw conveyors, and other machinery need vertical reducers, and to meet this demand the D. O. James Manufacturing Co. has designed a complete line of worm gear reducers.

The manufacturers say that "James vertical and angle reducers are not an experiment, however, but date back to the first installation in 1914. This type of reducer is small, compact, noiseless and powerful, and allows for the motor to be placed at a distance away from the drive itself, eliminating danger of spoiling the armature windings due to vapors, gas, or steam arising from the tanks or tubs over which they operate.

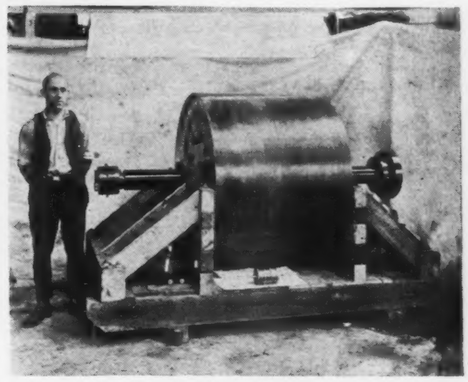
"The angle type worm gear reducer is made to meet the demand for a small, compact unit that can be tucked away in the corner or for driving a slow-moving belt conveyor where the drive is placed alongside the conveyor instead of extending out into the room and taking up valuable space.

"One of the many features of James vertical and angle worm gear reducers is the thrust bearing construction. All shafts are held in rigid alignment by thrust bearings so designed as to absorb all the thrust load without allowing the shafts to misalign themselves."

Lagging the Magnetic Pulley

OPERATORS often have considerable trouble and find that there is a loss of power from shipping belts. In order to overcome this slippage it is necessary to lag the pulley with some material capable of increasing the frictional contact of the pulley. An old piece of rubber belt or canvass is the usual covering.

This covering or lagging is held in place by short flat head screws or rivets. By this means greater loads can be put on



A magnetic pulley—lagging does not affect it

the belt and steeper inclines are promoted without slippage on the head or drive pulley.

When this head drive pulley is a magnetic pulley for separation and its operation depends on keeping cool ,the problem of lagging without curtailing the pulley operation becomes a poser.

This then raises the point of what to look for in a magnetic pulley. It should operate continuously without heating up. It should not require mechanical cooling and it should permit of lagging without the reduction of efficiency, according to the Dings Magnetic Separator Co. of Milwaukee, Wis.

Silica to Be Mined Near Hemet, California

MINING of silica in a mine south of Hemet, Calif., will be started soon by a syndicate of Hemet and San Jacinto men, according to a story in the *Riverside (Calif.) Enterprise*. A crusher, mill and warehouse will also be erected. The capacity of the plant will be 40 tons daily.

Granite rock will be crushed at the new plant for use in roofing manufacture. Members of the syndicate are Robert J. Kinser, Lyman Darling, Delmar Record and Willis Green.

News of All the Industry

Incorporations

Gordon Sand and Gravel Co., Denver, Colo., capital, $200,000.

South Pasadena Lime Co., South Pasadena, Calif., by M. C. Kuntz and others.

Pearl River Gravel Co., Wilmington, Del., $25,000. (Delaware Registration Trust Co.)

West St. Louis Quarry Co., St. Louis, Mo., Roy J. Blackburn, D. M. Hollingsworth.

Lincoln Sand and Gravel Co., Springfield, Ill., increase of capital from $178,200 to $300,000.

Kentucky Fluor-Spar Co., Marion, Ky., has increased its capital stock from $50,000 to $100,000.

Cincinnati Portland Cement Co., Wilmington, Del., $2,030,000. (Corporation Trust Co. of America.)

Holidaysburg Lime and Stone Co., announces its intention to incorporate in Allentown, Penn. papers.

Shope Brick and Cement Products Co., Toledo, Ohio, capital, $500, by Wm. Casey and Earl J. Flynn.

George A. Reynolds has engaged in business in South Pasadena, Calif., as the Reynolds Crushed Gravel Co.

Madison Sand and Gravel Co., Madison, S. D., capital, $15,000, by C. E. Olstad, Joe Welch and George Stenland.

Illinois Concrete Block Co., Chicago, has been incorporated for $10,000 by Frank Novotny, Otto E. and Paul B. Niehoff.

Mutual Sand and Rock Co., Denver, Colo. Capital stock, $20,000, by M. F. Larson, C. T. Mahoney and A. Larson.

Lincoln Stone Quarry Co., Lincoln, Mass., $50,000. President, Loreto Gentile; treasurer, Antonio Esposito and Guiseppe De Angelis.

M. F. Guaraldi, E. D'Arido and O. Pardi have engaged in business at 3108 Geary street, San Francisco, Calif., as the Acme Concrete Co.

Concrete Sand and Gravel Co., Baton Rouge, La., has been incorporated with a capital of $25,000 by C. O. Harris, S. L. Cooper and others.

Culver City Lime Co., Los Angeles, Calif., with a capital stock of $50,000, by C. D. Fox, George K. Noe and R. G. Van Vlerck, all of Culver City, Calif.

F. E. Conley Stone Co., Augusta, N. Y., $100,000 to $150,000 increase in capital. The office of the company is to be moved from Augusta to Utica.

Carroll Land Co., Carrollton, Miss., capital $40,000, incorporated by Ashleigh Harleson, J. H. Hobson, L. B. Bays. Produce sand and gravel at Avalon.

Stony Point Crushed Stone Co., New York, by S. R. Rosloff, J. M. Grossman, A. H. Diamant. (Attorneys, Olvany, Eisner and Donnelly, 331 Madison avenue.)

Universal Concrete Products and Gravel Co., South Bend, Ind., capital stock of $75,000. The incorporators are Harry Polis, Anna Polis, Alex and Norma Belkin.

Simbroco Stone Co., Boston, Mass., capital $500,000 and 75,000 shares without par value, by George S. Wilbur of West Roxbury, N. F. Winchess of Melrose and D. B. Stratton of Dedham.

Raymond Concrete Pile Co., San Francisco, Calif., has been incorporated with a capital stock of $50,000. Directors are: M. M. Upson, A. C. Everham, C. R. Blyth, R. L. Shurtleff and Burke Corbet.

Western Concrete Pipe Co., Los Angeles, Calif., has been incorporated with a capital stock of $100,000, by W. A. Johnson, Riverside; J. M. McAdams, Santa Monica, and T. S. Bunn, Los Angeles.

David Septic Tank Co., Charlotte, N. C., has been incorporated with a capital stock of $100,000, to make concrete tanks, by H. C. Rogers, T. R. Threatt, both of Charlotte and J. B. Rawls of Pineville.

Hawthorne Concrete Works, Tampa, Fla., capital stock, $30,000. Officers and directors: Ward H. Wadsworth, President; George M. Hayden, vice president; Frances A. Blair, secretary; James A. Blair, treasurer.

Sand and Gravel

Alabama Sand & Gravel Co. has opened a city office at 221-22 Shepherd building, Montgomery, Ala.

Deeks Gravel & Rock Co., Vancouver, B. C., is about to make improvements to its Howe Sound plant to cost about $25,000.

Vermillion Sand and Gravel Co., Vermillion, Ohio, has purchased the boat, "State of Ohio" and is reconditioning it to use in its business.

Angeles Gravel and Supply Co., Port Angeles, Wash., has completed the erection of a shed for the building of a tug to be used in its operation.

Appleton Sand and Gravel Co., Appleton, Wis., at a meeting recently elected Dr. R. T. Jones, president; W. F. Piehl, vice president; John Balliet, secretary and treasurer; Tony Maukosky, Kaukauna and Charles Simpson, directors.

The Greenville Gravel Co., whose main offices are at Greenville, Ohio, announces the following changes in the personnel of its organization: Frank Hoff, 616 Cornelia street, Saginaw, Mich., as manager of sales in Michigan; R. S. Frame, Jr., 301 North High street, Kenton, Ohio, as member of its sales organization in northwestern Ohio; Glen Brant, Klifton apartments, Fairfield avenue, Fort Wayne, Ind.; as a sales representative in the northeastern Indiana district.

Quarries

Rockhill Quarry, near St. Louis, Mo., is installing a No. 10 gyratory crusher and building a new spur track.

General Stone Co., Amherst, Ohio, W. G. Nord, president, will develop its stone quarry at Opeliska, W. Va.

Ohio Hydrate and Supply Co., Woodville, Ohio, are completing the installation of a 60 by 84-in. jaw crusher. This crusher is being installed below the floor of their quarry and will give the plant a capacity of 5,000 tons a day.

Cement

Monarch Portland Cement Co. has opened a sales office in Omaha, Neb., under the direction of Charles S. Marshall.

Sandusky Portland Cement Co's. unoccupied plant at Syracuse, Ind., was recently destroyed by fire. The plant had been dismantled.

A cement plant may be installed in the plant of the Cromwell Steel Co., at Lorain, Ohio, which went into the hands of a receiver four years ago, according to Lorain papers.

South Dakota's state cement plant is now in full operation, according to a statement of Paul Bellamy, general manager. The first shipment of cement to be sold from this point has been received by Thompson Yards, Inc., Aberdeen, S. D.

Danish motorship Tongking arrived at Oakland, Calif., January 30 with a cargo of 1200 tons of Norway cement. The importation of cement, docked at the Oakland harbor, has increased during the past six months, but the price of cement has been so lowered in this market that it is now sold at less than imported cement.

Lime

Standard Lime and Stone Co., Oakfield, Wis., plans a new one story, brick addition to cost $40,000.

Long Beach Lime and Putty Co., Long Beach, Calif., Alexander Foster, president, contemplates early construction of fireproof warehouse.

Tacoma and Roche Harbor Lime Co., has changed its place of business from Tacoma, Wash., to Roche Harbor and has also changed its name to the Roche Harbor Lime and Cement Co.

Department of Commerce, Washington, D. C., reports show that the production of acetate of lime decreased in 1924. The acetate of lime produced in 1923 was 164,396,124 lbs. in 1924 it was 128,942,544 lbs.

Cement Products

Nel-Stone Co., San Antonio, Texas, will erect a plant to manufacture concrete blocks.

Convention of cinder block manufacturers was held in New York the second week in February.

Fremixed Concrete Co., San Diego, Calif., is about to begin erection of $2,000 rock bunkers and shed.

Nathan E. Burdette, Damascus, Md., is reported to be erecting a building in Rockville, Md., for a cement factory.

Central Cement Company has opened a cement block factory at 1040 Montcalm street, Indianapolis, Ind.

Western Art Stone Co., Los Angeles, Calif., is to build a concrete block factory 83x119 ft. to cost about $6,000.

Zagelmeyer Cast Stone Co., Detroit, Mich., is about to begin construction of a factory, office building and boiler house.

Concrete Pipe Co., Ontario, Ore., is reported to have purchased the equipment of the Emmett Tile Factory in Emmett, Idaho.

Taylor Bros., Lexington, Ky., have purchased a concrete block machine and will operate a block business in connection with their quarry.

W. S. Bennett Co.'s cement block factory at Indianapolis, Ind., was damaged by fire recently. The damage estimated at $5,000 is covered by insurance.

Midland Valley Coal and Material Co., Clayton, Ohio, is building a new plant for the manufacture of concrete blocks, septic tanks and building material.

Wisconsin Cinder Block Co., Racine, Wis., of which L. E. Pittner, is manager, is planning erection of the first unit of its manufacturing plant, to be one story, and 60x110 ft.

I. Jourdan has leased property and will establish a plant for the manufacture of concrete pipe at Corcoran, Calif. Mr. Jourdan is now operating a similar plant at Selma, Calif. Dewey Jourdan will be in charge of the Corcoran plant.

Concrete Products Co., Columbus, Ga., organized with W. M. Camp, president, L. K. Camp, secretary, reported to establish a plant to manufacture concrete pipe in sizes from 10 to 72 in., also burial vaults and garden furniture.

Port Angeles Concrete Products Co., Port Angeles, Wash., is installing new bunkers and other necessities for the anticipated increase of business in the spring. This company makes sewer pipe, septic tanks, foundation blocks and roofing tile, Fred C. Strange is manager.

Northwest Cement Products Co., Davenport, Iowa, has grown, since it was organized in 1913, from a small frame building with an output of 100 blocks a day to a modern plant with a capacity of 1,000 blocks per day. This company also makes concrete garden furniture and trimstone.

Silica Sand

American Silica Co., Rogers, Ark., which was recently incorporated, has begun to build its new plant and three carloads of machinery have been received. Charles Baldwin is president, E. E. Adams, vice president and S. G. Parsley, secretary-treasurer.

Gypsum

Great Western Gypsum Co., Los Angeles, Calif. is about to begin erection of $1,000 addition to its warehouse at 1701 Downey road.

Pacific Portland Cement Co., San Francisco, is considering reopening its gypsum mine in Mound House, Nev., according to Nevada papers.

American Gypsum Co., Port Clinton, Ohio, at the annual meeting of the stockholders elected the following officers and directors: president, J. H. McCrady, Pittsburgh, Penn.; vice-president, F. J. Griswold, Port Clinton; secretary and treasurer, J. B. Davis, Cleveland, Ohio; other directors, P. K. Tadsen, Port Clinton; Charles Miller, Cleveland, Ohio; Edward McCrady, Braddock, Penn.; and Harry Beens, Pittsburgh, Penn.

Personals

Sam F. Ryan recently became general manager of the Builders' Sand and Gravel Co., Waco, Texas.

Wm. E. Carson, president of the Riverton Lime Co., Riverton, Va., is receiving the sympathy and condolences of his wide circle of friends because of the recent death of his only son.

F. M. Pinnegar, a well known figure in the cement and lime industries, has become affiliated with the Palmer Lime and Cement Co., York, Penn., as assistant to the president.

J. W. Hildebrand, formerly connected with the Jones Foundry and Equipment Co., Chicago, recently became sales engineer for the Foote Bros. Gear and Machine Co. of Chicago.

Samuel Phillips, general manager of the Stewart furnace, Sharon, Ohio, has been elected president of the Union Limestone Co., Youngstown, Ohio. He succeeds his father in his new position.

Irving Warner, chief engineer of the Charles Warner Co., Wilmington, Del., and of the American Lime and Stone Co., Bellefonte, Penn., has left Wilmington for a European trip to be gone two months.

A. B. Fosseen, president and general manager of the Washington Brick, Lime and Sewer Pipe Co., Spokane, Wash., returned to his home recently after undergoing an operation for shoulder trouble at St. Luke's hospital.

Llewellyn T. Bachman, after 17 years service for the Santa Cruz Portland Cement Co., Davenport, Calif., recently resigned his position there to become the superintendent and directing chemist for the Peralta Portland Cement Co., San Francisco, Calif.

Mr. and Mrs. John C. Eden and Mr. and Mrs. Albert R. Bouffleur were robbed of about $14,500 worth of cash and valuables by four armed highwaymen on a boulevard near Pasadena, Calif. John C. Eden is the president of the Superior Portland Cement Co., Seattle, Wash.

Charles B. Nims has been appointed district manager for the Portland Cement Association at Portland, Ore., with offices in the Gasco building. Mr. Nims is a graduate of Leland Stanford University and after a number of years of diverse engineering experience in the west became a field engineer for the association in Oregon in 1922.

Rock Asphalt

Kentucky Rock Asphalt Co., Louisville, Ky., at a stockholders' meeting elected the following officers: Wiley B. Bryan, president; W. H. Tarvin, first vice president; Lewis Apperson, second vice president; W. J. Cunningham, third vice president; A. A. Hermes, secretary and treasurer.

Obituary

Dr. William F. Hillebrand, for the past 17 years chief of the chemistry division of the Bureau of Standards, died February 7, following a short illness. He was an honored member of the National Academy of Sciences and was a past president of the American Chemical Society. He made one of his greatest economic discoveries in 1904 when he pointed out the possibility of recovering and utilizing the enormous quantities of potash that are volatilized during the clinkering of portland cement. He has been too seldom given credit for suggesting what is now an accomplished fact.

Manufacturers

W. C. Lipe, Inc., Syracuse, N. Y. announces that it has bought the business, patents and rights of the Meachem Gear Corp., of Syracuse.

Norma-Hoffman Bearings Corp., has moved its factory and general offices from the Long Island City plant to its new plant at Stamford, Conn.

Brown Instrument Co., Philadelphia, Penn., reports that the suit against the Republic Flow Meters Co., in the Federal Court at Chicago, has been settled satisfactorily.

Consolidated Fuel Co., Pittsburgh, Penn., an associate of the Bertha-Consumers Co., has had an engineering survey made for the purpose of erecting a modern tipple plant at Powhattan, Ohio.

Traylor Engineering and Manufacturing Co., Allentown, Penn., announces that H. V. Croll, who has been manager of the southeastern territory for that company with offices at Los Angeles, Calif., has been transferred to the home office.

Dings Magnetic Separator Co., Milwaukee, Wis., builder of magnets, magnetic pulleys and separators, announces the appointment of C. R. Considine as its representative in Iowa and Minnesota territory with offices at 1022 Langworthy street, Dubuque, Iowa.

Lewis-Patten Co., San Antonio, Texas, has been appointed as sales representative for the McMyler-Interstate Co., for the territory of the entire state of Texas, and will specialize in the sale of gasoline and steam shovels, clam-shell buckets and standard gauge locomotive cranes.

Koppel Industrial Car and Equipment Co., Koppel, Penn., announces the opening of a new sales office in the Rialto building, San Francisco, Calif., under the management of Harry C. Kraft. The company will carry a stock of material for immediate delivery at its warehouse at San Francisco.

De La Vergne Machine Co., 940 East 138th street, New York, describes and illustrates its horizontal type SI oil engines in bulletin No. 184. These engines are Diesel engines modified by the elimination of the air compressor and do not use the heating torch, electric starting equipment or hot spots.

Barber-Greene Co., Aurora, Ill., announces that it has placed three assistants with its district managers at Pittsburgh, Cleveland and Detroit. H. H. Driver to assist J. A. Gurney at Pittsburgh, Penn; Frank S. Howard to assist E. D. Cassel at Cleveland, Ohio; and P. S. Frederick to assist C. B. Gould at Detroit, Mich.

Trade Notes

Consolidated Materials Corporation announces removal of its main offices to suite 600 Duffy-Powers building, Rochester, N. Y.

Trade Literature

Challenge Co., Batavia, Ill., presents an extensive line of tanks and vats for many industries and a wide range of uses.

Manitowoc Shipbuilding Corporation, Cement Mill Dept., Manitowoc, Wis., has issued a bulletin on kiln and cooler equipment.

Thew Shovel Co., Lorain, Ohio, has published a new pamphlet demonstrating its center drive shovel truck. Complete details are given in Thew Bulletin No. 201.

Hercules Powder Co., Wilmington, Del., has just published a new booklet on "Safety in the Use of Explosives." Free copies will be furnished by the company on request.

The Bonnot Co., Canton, Ohio, has just published its bulletin No. 64 describing the Bonnot Unit air ball mill for pulverizing coal for the direct firing of boilers.

Kent Machine Co., Kent, Ohio, in its new catalog No. 11, presents various types of continuous concrete mixers, especially those adapted to use in cement products plants.

Brookville Truck and Tractor Co., Brookville, Penn., in its bulletins B-1 and B-4 demonstrate the utility and efficiency of its locomotives using Ford ton truck and Fordson tractor power units.

Heine Boiler Co., St. Louis, Mo., Bulletin No. 52 describing and illustrating the H-type of longitudinal-drum boilers. This bulletin is well written and beautifully illustrated with pictures and diagrams.

Nuway Boiler and Engineering Co., 53 West Jackson boulevard, Chicago, has issued a bulletin in which boiler water circulation is discussed. This bulletin should interest all engineers and executives concerned with the operation of boilers.

Denver Rock Drill Manufacturing Co., Denver, Colo., in a pamphlet "Profit or Loss—1925", presents a convertible, model 37 Sinker and model 337 Waugh turbo drifter, the same machine, but convertible from one form to the other.

Byers Machine Co., Ravenna, Ohio, recently published a catalog demonstrating "Bear Cat" all purpose light crane. This crane handles seven interchangeable attachments and the catalog well illustrates its adaptability with photographs and description.

Celite Products Co., Chicago, recently published a booklet "The Insulation of High Temperature Equipment" in which the heat losses of various equipment are discussed and demonstrated by means of graphs and tables from experimental data. The various types of lime kilns and insulations for them are given considerable study.

The Osgood Co., Marion, Ohio, has recently published bulletin No. 250 and circulars No. 251 and 253 describing and illustrating its revolving power shovels, which are convertible to crane, clamshell and dragline service. Gasoline, Diesel, electric or steam power can be used for these shovels as cited in circular 253.

Engineering Experiment Station, University of Illinois, Urbana, Ill., is issuing a circular No. 12, entitled "The Analysis of Fuel Gas". This circular gives a description of the apparatus developed at the university for analysing fuel gas and methods of analysis best adapted to this apparatus. A comprehensive review of methods for other types of apparatus is included in the appendix.

Construction Contracts in January, 1925

ACCORDING to a summary of the business situation issued by the Department of Commerce: "Contracts awarded for building construction in 27 northeastern states during January, 1925, contemplating expenditures aggregating $255,367,000, as against $283,091,000 contemplated by December, 1924, awards and $261,320,000 by awards in January of last year. Allocation of awards to the general classes of construction show a decline from the previous month and January of last year to be general except in the case of commercial buildings which increased over the previous month and January, 1924, both in point of value and aggregate floor space.

"Concrete pavement contracts awarded in January declined from the previous month but increased over January, 1924."

New Quebec Cement Plant Begins Producing

LAST week saw the inauguration of the new plant of the Unic Cement, Limited, which is located at St. Francois de Sales, near Terrebonne, Que. The plant was inaugurated by J. Allan Bray, M.P.P., A. W. Patenaude and Josaphat Blondin, three officials of the company. The party, which was composed of some five hundred persons invited by the directors, left Montreal in a special train.

Initial production is 300 bbl. and the first product will be placed on the market within the next fortnight. Production will be steadily increased and it is expected that the total capacity to be reached before the end of the year will be 900 bbl.

The company is capitalized with $1,000,000 of fully paid common shares, and there are first mortgage bonds outstanding in the hands of the public for $250,000.

Cuozzo Takes Over Bangor Cast Stone Products Company

GEORGE CUOZZO has taken over the control and sole management of the Bangor (Maine) Cast Stone Products Co., which he started in 1915. This is one of the larger concrete products industries in New England and produces a number of different building units, including brick, block and trimstone. It also produces sewer and culvert pipe and has its own sand and gravel plant. At one time it employed 169 men in its plant.